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HEALTH LESSONS



JEROME WALKER, M.D.

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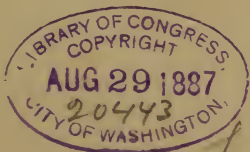
HEALTH LESSONS

A PRIMARY BOOK

✓ BY

JEROME WALKER, M. D.

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AND ON PHYSIOLOGY AND HYGIENE AT THE BROOKLYN CENTRAL GRAMMAR-SCHOOL;
CONSULTING PHYSICIAN TO THE BROOKLYN SEA-SIDE HOME FOR CHILDREN;
LATE PHYSICIAN TO ST. JOHN'S HOSPITAL, THE SHELTERING ARMS NURSERY,
AND THE BROOKLYN SOCIETY FOR THE PREVENTION OF CRUELTY TO CHILDREN.



NEW YORK
D. APPLETON AND COMPANY

1887

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P R E F A C E .

IN this little book the aim has been to teach health-subjects to young children in a truthful and interesting way, and by somewhat different methods than those usually employed. While there is special teaching as to the effects of alcoholic stimulants and of narcotics upon the human system, they are presented in such a way, in connection with other subjects, as is believed will appeal most forcibly to the imagination and the reasoning powers of children, and leave the strongest impressions upon the mind as to the evils attending the use of these things.

The lessons in the book have been tested in ten-minute talks and reviews to the primary classes of the Brooklyn Training-School for Teachers. Most of the illustrations were evolved by the author as the manuscript progressed; but, without the hearty interest and artistic skill of Messrs. Harry and Dan Beard, and of Dr. R. L. Dickinson, they would have

failed to explain the text, and to impress facts upon the memory.

The initial letters (at the opening of the several lessons, and of the talk to teachers), taken together, make a sentence of three words, which form the motto of the book, and which the pupils might try to decipher.

J. W.

8 SEVENTH AVENUE, BROOKLYN, *May* 1, 1887.

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TO THE TEACHERS.



HAVING had ample opportunity during the last twenty years to study children, both in health and disease, and also occasion to instruct them in hygienic matters, there has been formulated in the mind of the writer, as a result of this experience, the following maxims :

1. *Health-subjects should be systematically taught to young children*, not only to prolong their life and insure them comfort, but also to enable them the better to cope with other studies.

2. *In order to teach health-subjects well, the teacher should have broad, unprejudiced views, and should never allow himself to ride hobbies.* Owing to our present limited knowledge of some hygienic subjects, and because children as well as adults are not molded alike, but have individual peculiarities, it is frequently necessary, if we are strictly honest in our teaching, to say, "as a rule," "generally," etc.

To teach that certain health laws are inflexible and must apply to all children alike, is an absurdity. A late celebrated teacher of medicine used to enjoin his students to *generalize the disease, but to individualize the patient*. So it may be said to all instructors in hygienic subjects, generalize your hygienic teaching; study your children before you attempt to insist upon the observance of what may casually seem to you to be just health laws. If children think

they are not able, or if they appear not to be able, to obey them, it may be well to consult, in regard to such children, some medical authority, such as the family physician. By this course, injustice may be averted.

3. *In teaching health-matters to your children, little stress should be laid on purely anatomical points.* Such are the names and location of bones, muscles, and blood-vessels.

Anatomy is proverbially a dry subject, and hard to be remembered, even by adults; and surely only enough should be taught to prepare the way for physiology, which is of greater interest, and even this should be subordinate to the study of hygiene, or the art and science of the preservation of health, which is the main object of our present instruction. It is pitiful to see children oppressed by a mass of technical anatomical knowledge, which is of little interest to them, which they find hard to remember, and which can be acquired later if necessary, and which should not take the place of hygienic subjects of greater interest and importance.

4. *Traditions and popular beliefs concerning health and disease should be very carefully weighed before being given to children.* A little girl came from school one day greatly worried because her teacher had told her class that whenever any one sighs a drop of blood is lost, a tradition which has no foundation in fact. Over and over again has it been taught that the body changes once in every seven years, whereas in reality many of its particles or cells are changing constantly, so that it is impossible to truthfully say that the entire body changes in a certain specified time.

There is much untrustworthy hygienic teaching in schools, because of many popular but foolish traditions as to what is and what is not necessary for health; and some teachers, as well as some other non-medical people, are so constituted that they believe that they can doctor others, though they would scorn to dabble in astronomy, theology, philosophy, psychology, or even horse-doctoring.

5. *Ample time and care should be given to the study of physiology and hygiene, and judgment in their application.* A super-

intendent of public schools in a large city once said: "Physiology is not only an interesting but an easy study, for every one carries lessons on the subject about with him in his own body." A principal of a high-school remarked that the study of physiology and hygiene need not take a whole term, for he had taught both subjects to a class in *six weeks*. Both these statements convey wrong impressions. While it is true that we do carry our individual anatomy and physiology about with us, the possession of these **neither teaches us the laws of health nor shows us how to teach hygiene** in a truthful, interesting, and unbiased way.

While it may be considered a brilliant feat to complete a course of study in a very short time, it is not in the case of physiology and hygiene a wise thing to do; for, unlike some other studies, which are useful only in stimulating the memory or perceptive powers, the study of health is to give comfort, to maintain and strengthen all the resources of the body, and, to prolong life and, to yield the best results, should begin with the primary pupil and end only with the life of the individual. Its teachings can be used not only for the betterment of school-life, but apply also to the home-life, and they enhance the value of all other studies, and will cause them to be learned more intelligently. The study of health, therefore, should not be finished in any stated number of weeks.

It has been maintained that teachers of health-subjects should be able to say to their pupils, "Do as I do, not as I say." Theoretically this is right, practically wrong: for a teacher may not be physically strong, and yet give sound instruction on physical culture; while a robust teacher may be so full of vitality and strength as to fail to appreciate the natural feebleness of some pupils, and may thus unintentionally impose upon them tasks which only the strongest pupil can master.

Again, a teacher may have very strong likes or dislikes for certain articles of food; or, because of intemperate friends, may see nothing but evil in an alcoholic stimulant, even when used as a medicine by a careful and conscientious physician; or may have

suffered so much in early days from the evil results of bad air, that as a teacher he talks forever about the necessity of good air, to the exclusion of other equally important topics.

Let the teacher aim to make the study of health truthful, interesting, and practical. Do not confine yourselves to the study of one text-book. On some subjects there is unanimity of opinion among authors, on others an honest difference of opinion. A text-book, such as this little one before you, while of value as a nucleus for study, and to awaken in children an interest in health-matters, can not cover all sanitary subjects, or give more than an outline of any one. Among the publications that can be read or studied with profit by the teacher are—

The Sanitarian, a monthly journal.

Lend a Hand, a monthly journal.

Health Primers, D. Appleton & Co., New York.

Health Primers, Presley Blakiston, Philadelphia.

Dangers to Health (illustrated), Presley Blakiston, Philadelphia.

The Maintenance of Health, G. P. Putnam's Sons, New York.

Health Notes for Students, G. P. Putnam's Sons, New York.

Number One, Funk & Wagnalls, New York.

Wear and Tear, J. B. Lippincott Company, Philadelphia.

Healthy Skin, Lindsay & Blakiston, Philadelphia.

History of a Mouthful of Bread, Harper & Brothers, New York.

The Servants of the Stomach, Harper & Brothers, New York.

Manual of Dietetics, William Wood & Co., New York.

Hufeland's Art of Prolonging Life, Lindsay & Blakiston, Philadelphia.

Reports of State Boards of Health.

To *interest* children the teacher should use plain, simple language, but not babyish talk, and it will be necessary to go over and over again almost every subject. Blackboard drawings, even the most crude, are useful to fix points in the memory. Appropriate stories may be used to exemplify physiological and hygienic facts. Suitable pictures (even caricatures) from illustrated papers and children's books can be collected and used as occasion requires.

A good magnifying-glass will show the markings of the skin and some of the pores. An occasional glimpse through a microscope of a drop of blood, some starch-granules, a section of the skin, or a gland, will enliven the study. Dissections can be made, before the class, of the heart, lungs, larynx, eye, or leg of some animal, care being taken to rid the specimens of as much blood as possible, and using cotton wadding and soft tissue-paper to remove stains, and to hide objectionable features.

To make health-subjects *practical*, places may be indicated upon the body where the pulse can be felt. Habits of cleanliness should be taught. Children should be shown how to expand the lungs properly, and what differences there are between poorly and well expanded chests. By listening over the chest of a fellow-pupil the child can learn how the current of air sounds as it goes in and out of the lungs during their contraction and dilatation. The teacher can show, with feathers, and in other ways, what is meant by currents or draughts of air; can show what is meant by properly ventilating and warming a room; can make pupils understand how it is that contagious diseases may spread in a school, if children who have been ill with such diseases return to school before they have entirely recovered, and especially if their outer clothing comes in contact with that of other children in badly ventilated hallways or wardrobes. Calisthenic exercises will be made more interesting if from time to time measurements are taken of the circumference of arms, waists, and chests. Bad habits may sometimes be overcome by reasoning with a child from a health standpoint, and bad tendencies broken up through a knowledge, on the part of both teacher and pupil, of what is healthful.

While a teacher should not take the place of a parent, there are times when a conscientious teacher with a knowledge of health laws can influence the child best through his home-life and its surroundings. Sometimes it will be impossible to have in the school-room clean hands and faces, well-brushed hair, clean teeth, sweet breath, freedom from bodily odors and from bad language, until home influences are bent in this direction. So the teacher may be a health

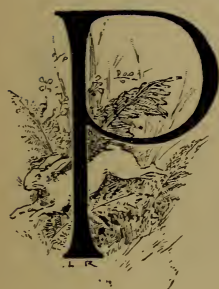
missionary, and by inducing an appreciation of cleanliness, order, purity, health, and strength, his hold on the child's mental faculties becomes stronger and more hopeful, and teaching is no longer mere drudgery.

■ The lessons in this book should be carefully read by the pupils in the class-room, and comments and explanations made by the teacher when necessary. By dividing each lesson as printed into several, by means of the paragraphs, the pupils will not tire.

HEALTH LESSONS.

LESSON I.

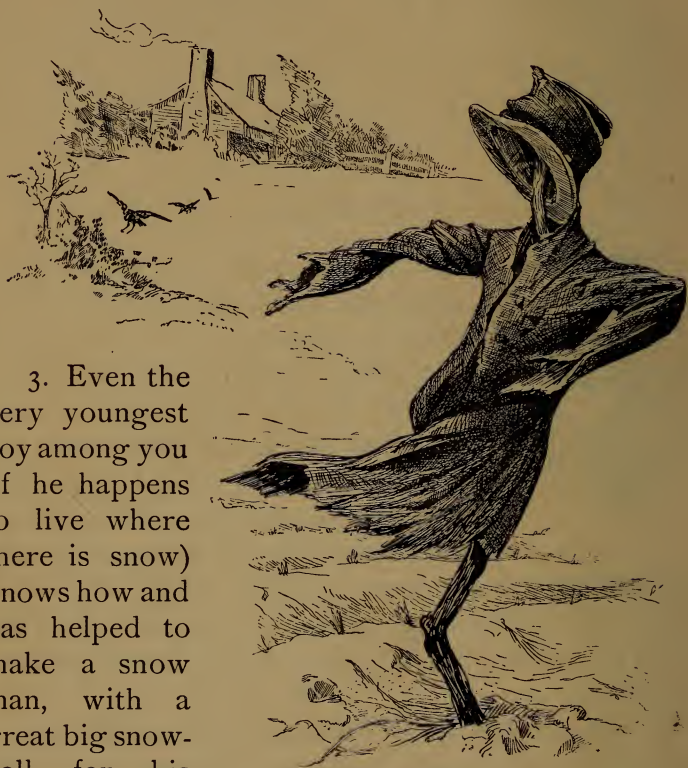
Our Bodies.



PROBABLY most of the children who read this book have pet dogs, cats, or rabbits, or, if the readers are girls, dolls of various kinds. Some of you have neither such pets nor dolls, but little baby sisters and brothers; and I agree with you that these pets are the best of all, because they learn to laugh and talk, and to coo in their winning way, and to put their soft, chubby arms around our necks. But the dolls can never do this, if they should last a hundred years.

2. Some of the girls, I am sure, have made rag or paper dolls, or perhaps corn-cob dolls with corn-silk hair, and you have dressed them nicely, and painted smiling faces; but they stay smiling, unless you paint them differently, and they are never able to undress themselves. Some of you have seen scarecrow-men in the fields. At a distance they looked like real

men, but when you came close to them all that you found was some old clothes put over poles or sticks.



3. Even the very youngest boy among you (if he happens to live where there is snow) knows how and has helped to make a snow man, with a great big snow-ball for his

trunk, or the largest part of the body, a smaller one for his head, and smaller ones still for the neck and his limbs—that is, the arms and legs. When he is complete, he appears something like a real man, but the winds blow dirt over him, which he can not brush



off; and the sun comes out and blazes at him until his head droops, an arm drops off, and he melts away little by little, and disappears in a pool of snow-water. No matter how much the boys want to keep him, they can not give him food to strengthen him; they can not warm him by pipes inside filled with some warm fluid; they can not induce him to move. His joints (that is, where his knees, elbows, fingers, wrists, shoulders, ankles, and hips ought to bend) are stiff, and in his neck and back there is not the slightest chance of any movement.

4. The snow-man is not so well provided for as are dolls, especially the jointed dolls, which have not the freedom and pleasure that your pets have; yet the pets are not to be compared with babies, who have some one to care tenderly for them. But some one says: "The dolls don't suffer pain—you can stick pins into them without hurting them; but babies do suffer pain." Yes, that is so, and the human baby is really more helpless than the baby of any other kind of animal, but none of us would like to be a doll nor a pet animal.

5. It is important to know something about babies, as well as about children and grown-up people, for, if they don't die from some accident or severe illness, the babies will become children, and finally men and women. Much illness and many accidents occur because the people who have charge of babies do not take proper care of them, or the children are not taught how to take care of themselves. Some of you,

no doubt, have seen your pet animals sicken and perhaps die, because you either did not give them enough water, food, or shelter, or you have over-cared for them. So babies, children, and grown folk need just enough, and not too much, food, warmth, exercise, and other things necessary for health and strength.

6. But, before you can understand why people should need all these things more than dolls, and scarecrows, and snow-men, and even than most lower animals do, you must know of what our bodies are made, how all the parts do their work, and what is necessary to keep them in good condition. You must, therefore, study a little Anatomy, Physiology, and Hygiene.

7. Our bodies, or the houses we live in, are more wonderful than any other houses, and, whether we are rich or poor, they are very much alike. Did any of you ever think that your bodies don't belong to you, that they are simply loaned to you? If you take good care of them, they may last you many years. If you don't, you may only live in them a very few years.

8. Our bodies (with the exception of our arms and legs) are divided into room-like places; but these places are not empty, as you find many of your dolls are when they get broken. In each of our heads is delicate machinery by which we move our eyes, tongues, arms, and legs; and other machinery by which we talk, see, smell, hear, taste, feel, and, above all, think. In the trunk is the breathing apparatus

and the machinery for making and carrying blood; the mill, where the food is softened; and the liver and other parts or organs, which may be called factories or store-houses. There are other kinds of machinery in the trunk besides those already named, but we must tell you about these later.

9. Our arms and legs are not solid, neither are they hollow nor filled with sawdust nor rags as dolls are. In them are muscles, which help us to walk, run, make gestures, play ball or any games, and to do useful work; also delicate tubes to carry in nourishment, and to carry off what must pass out of the body, dead and useless matter. To keep the muscles and tubes and other things besides in place, and so preserve them from injury and from getting in one another's way, there is packing material, some of which is more delicate than that which is put around the beautiful French and German toys, and about fine glass-ware. This packing material is found in all parts of the body, and is known as *connective tissue*, because it connects one part with another.

10. Now, if all this beautiful and delicate machinery we have mentioned is properly taken care of, boys and girls will be likely to grow up strong and well, and be able to do much good in the world, by knowing how to prevent illness and pain. We can't afford *just to grow* as Topsy, in "Uncle Tom's Cabin," said she did—that is, just up and up, or round and round, or from side to side; but we must improve the mind, and learn all we can about ourselves, about flowers



and animals and all living things, and many things that can't be said to be alive, such as stones and shells. This knowing more and more, and being able to do more and more, is called *development*, a big word, but one you ought to remember.

11. Your animal pets do not develop very much, neither do the flowers. Things without life do not even grow. A piece of thread never grows into cord or rope, nor a little baby doll into a grown-up doll. You see in this picture (drawn from a photograph) what at first looks like a real bride, but after all it is only a pretty little girl who has been dressed up like a bride. It will be a long time before she can wear a real bride's dress, for it takes years for growth and development.

For Recitation.

1. How do pet animals differ from dolls, or snow-men, or scare-crows? They can move of their own accord—can eat, smell, feel, and hear.

2. How do human beings differ from pet animals? They can remember more, learn more, and do more.

3. Why is it necessary to take more care of babies and animals than of dolls? Because, if we do not, they will become ill and die.

4. How can we know how to care for ourselves, for babies, and for animals? By learning of what the bodies are made, how all the parts do their work, and what is necessary to keep the bodies in good condition.

5. What is the result if our bodies are in good condition and we take proper care of them? They *grow* larger and stronger, and, by *developing*, gradually enable us to learn and do more and more.

LESSON II.

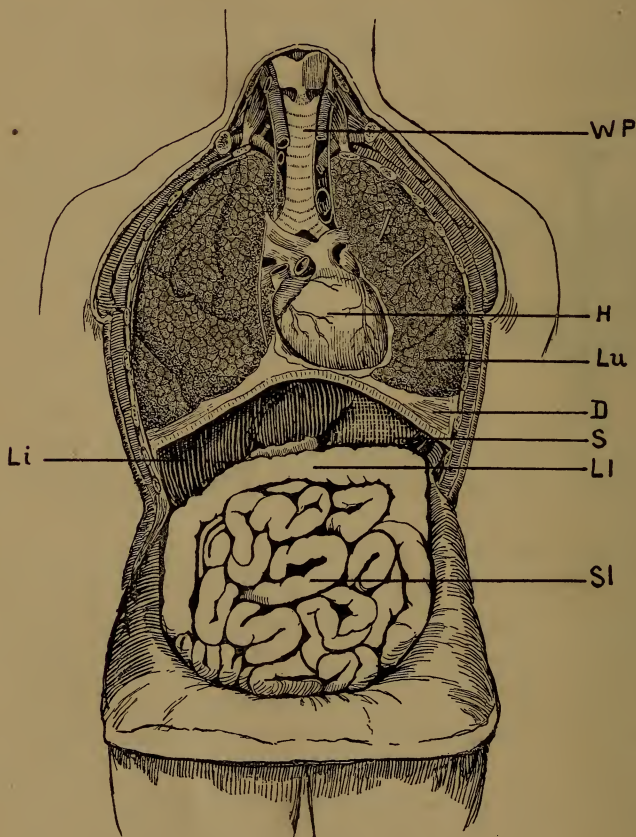
What our Bodies need.



IF we are to work or play well, our bodies must be in good condition, or in "prime order," as the farmer would say of his sleek and healthy cattle. Weak and sickly persons may work and play, but they can not *enjoy* all they do as strong, healthy people can. There are many little boys and girls so delicate that they can't play tag, puss in the corner, or hop-scotch, without being tired out.

2. No one can be well unless the body keeps *warm*, even without the aid of very warm fires and much clothing. Your doll's body does not feel warm unless it is in a very warm room, or in warm out-door air; for, if by mistake you should leave her out in the yard, and the weather should grow even a little cold, she would be cold too. But, if you should find a little kitten out in the cold, even if the rain had fallen, and the kitten's fur was wet, its body would feel warm. It would take *very* cold weather to make the kitten's body feel cold; and, if it did feel so, poor

little kitty would probably be either dead or dying. Why does the doll's body feel cold, while the kitten's, the dog's, and your own are warm? Because the



Some of the Machinery: W P, the wind-pipe; H, the heart; Lu, the lungs; D, the diaphragm; S, the stomach; Li, the liver; L I, the large intestine; S I, the small intestine.

doll is not *alive*, as you and the kitty and the dog are.

3. And what is being alive? It is *motion*; for even if you are perfectly still, perhaps injured so you can not move even a finger, so long as you are alive your heart will be beating, and all the wonderful machinery inside of your body will be moving. Streams of warm blood flow rapidly from one part of the body to another, carrying food and warmth. The heart pumps the blood into the tubes which carry it through the body. The lungs take in pure air and send out bad air; thousands of little bags called glands empty themselves into the mouth, throat, nose, and other parts of the body, so as to keep these parts moist and smooth.

4. It seems sometimes as if there must be hundreds and hundreds of little fairies busy inside of us, so quietly and quickly is all the work done. While we are alive, all the motion continues, and keeps the inside of our bodies warm, and that warms the outside too. If we are lazy or ill, and don't stir about very much, we are likely to be easily chilled; for then our inside parts do not work so quickly and smoothly as they should. So, you see, *life in us means motion*, and *motion means warmth*, and *warmth is necessary to health*.

5. There are animals in whom the blood does not move fast enough to keep them warm in cold weather, such as frogs, bats, snakes, and turtles. When the cold weather comes, they go into holes

in the ground and trees, or under rocks. They sometimes come out on a warm day for a breath



of fresh air,
and to bask
in the sun-
shine, but
most of the

time keep under cover. Compare a frog or turtle
in cold weather with a rabbit. The frog sleeps

underground, and only leaps when compelled to ; but the rabbit kicks up his heels, stamps on the ground, runs in and out of the bushes, jumps over stones, and is very lively.

6. Perhaps you will see what warmth can do when I tell you that frogs and snakes have been kept in an ice-house for two years and more, and then restored to life, by bringing them into warm air. Children and most of their pet animals are warm-blooded, and would live but a short time in an ice-house, though it is as true of them as of the cold-blooded animals that, to bring life and motion back to the body, warmth is necessary.

7. Our bodies give out heat, so that, if in winter a room has many people in it, and the windows and doors do not admit much air, the room will be quite warm without any stove in it. The farmer knows that a number of cows or horses in a close stable, even if the weather is cold, will keep the stable quite warm. Babies who are too young to move about much, and old people whose bodies are worn out by age and toil, often suffer much from cold, unless they have enough warm clothing, and the rooms they live in are warm and comfortable.

8. Sturdy boys and girls can endure a good deal of cold, but these should not brag about their strength, and run unnecessary risks. I know boys and girls, and so do you, who will sit on the cold stones in winter, after being overheated with a game of tag, or who will lie on the grass in the autumn when

the earth is growing cold, or in the early spring when the frost is coming out of the ground, leaving it damp and chilly. The cold and damp take much warmth from the bodies of these children, and often cause sore throats and other diseases. *To keep up warmth, then, is very important*; and proper air, food, exercise, bathing, and clothing will help to do it.

9. Another thing our bodies need for health, which gives strength and beauty, is *purity*, or *cleanliness*. You know that in cities dirt-carts come around once in a while to carry off the dirt which lies in the streets. Men go down into the sewers to clean them out. Vacant lots, in which water stands and becomes *stagnant* and dangerous to health, are filled with dry earth and ashes, and bonfires are made to get rid of dead and decaying leaves, etc. All this is done to purify the cities and make them healthful.

10. In our houses we burn garbage and everything that we believe, by decaying, may poison the air about us. Cellars, closets, and pantries, as well as bedrooms, sitting-rooms, and nurseries, should be kept clean and sweet. Now, we can't sweep or scrub out our bodies, nor use whitewash, nor can we hire any fairies to do all this, and yet it is necessary for health that our bodies should be kept clean both inside and outside. But care of the outside, by bathing, exercise, and clothing, will help to keep the inside clean.

11. Not all that we eat turns into blood. Some of the skin of an apple, some of the coarse part of brown bread, or the seeds of figs and grapes, for example,

help the food to hurry along; but would do harm if not cast out of the body. Some of the air we breathe into our lungs becomes poisoned by the material which is constantly dying in the body. This must escape by the lungs, and through the skin and kidneys.

12. While we are asleep and when we are awake, the thousands of little cells, or rounded bodies which, when joined together, make our muscles, bones, skin, and every part of our bodies, are drinking in for their growth the food which the blood brings them, and sending away what they can not use, to be cast out of the body. If we are lazy and don't stir around, if we eat too much, if we are dirty, we don't give these little cells a fair chance to do their work, and then we don't feel well.

13. If a person gets into the bad habit of drinking alcoholic liquors, his mind is not clear and clean, and he does not care, or know enough, to keep his clothing and body clean, and becomes disgusting to everybody. What a blessing it is that dolls and pet animals don't upset themselves by drink!

14. While warmth, motion, and purity are necessary for life and health, they can not make us live forever. Everybody dies, from the tiny insect, whose life is but a few hours long, to the greatest and most useful man or woman. But he gets the most good out of life, and usually lives the longest, who takes proper care of himself. Most of us ought to live to be at least sixty years old; some to eighty, or



even one hundred. Your puppy ought to live fifteen or twenty years, your kitten ten years, a horse forty years. Your doll, if good care is taken of her, should last many years. I know of one thirty-six years old. She is called the "old-fashioned girl," because she is dressed as people were dressed over thirty years ago, and her hair is smoothed down over her temples. She doesn't know what bangs are. Here she is surrounded by other dolls. Bear in mind that, though a doll may last a number of years, it does not live.

For Recitation.

1. To be in good health, what are necessary? Warmth, motion, and purity.
2. Why is warmth necessary? Without it, the blood would not move, and the duty of the blood is to build up the body.
3. Is there much motion in the body during life? Yes; not only do the heart, lungs, stomach, and other organs move frequently, but also particles in bones, muscles, and every part.
4. What are these particles called? Cells.
5. How is purity or cleanliness necessary? Without it, the particles of the body which die or are used up every moment, to make place for new material, would poison the body. They could not be cast out.

LESSON III.

Air and Sunlight.



THE baby, the puppy, and the doll, which you see in the picture, in the fore part of the book, don't know what they are to meet with in the world.

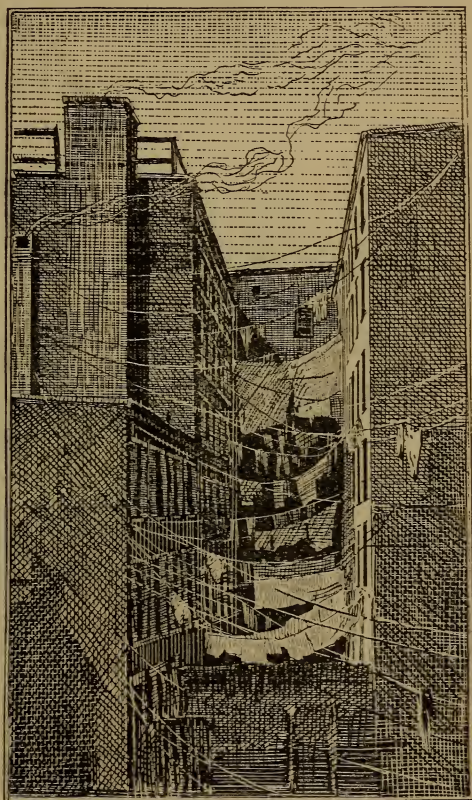
2. If the baby and puppy are to have warmth, motion, and health, they need most of all plenty of pure *air* and *sunshine*. One can live without food for several days; but not for five minutes without air. Without plenty of good air every day, and the light and warmth that the sun gives, both the baby and the puppy will get thin and unhappy; the baby will become pale, for the blood will lose its healthy red color, and he will neither enjoy food nor feel like playing. The puppy will droop, too, and will not be a very lively dog.

3. When the air is not pure, or when there is not enough of it, a candle will not burn well, and we call it a sickly light; without sunshine green plants bleach out like celery. Some of you have seen in the cellar, or storehouse, a little potato-plant stretching forth its tender stalk and leaves toward the ray of light from

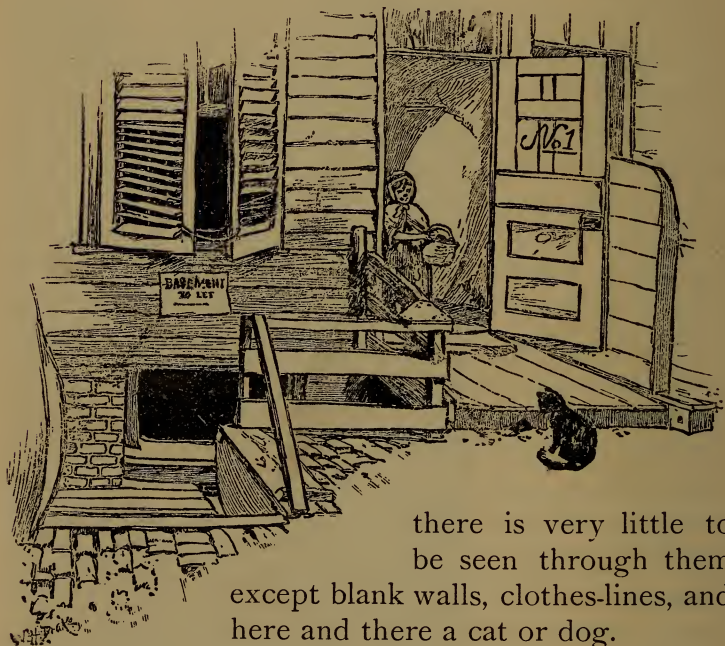
some crack or hole, just as if the leaflets were arms to grasp and hold the precious light, which, with its friend and ally, air, is meant to give life and health.

4. You who live in the country know that along the fences, and on the shady side of big trees or thickets, there are many little white, or light-green, tender plants; while out in the meadow, where the sun and air have full play, leaves are of a darker green, flowers of brighter hue.

5. In portions of large cities, people are crowded together in great numbers, some houses holding thirty or more families, who, because they are poor, and house-rent is high, live in rooms



which for most of the time are very dark. The windows become grimed and dirty from the smoke which the broken stove gives out, and from the dust which gathers in small rooms where so many people live. Some of these people don't wash the windows very often. When the windows are cleaned

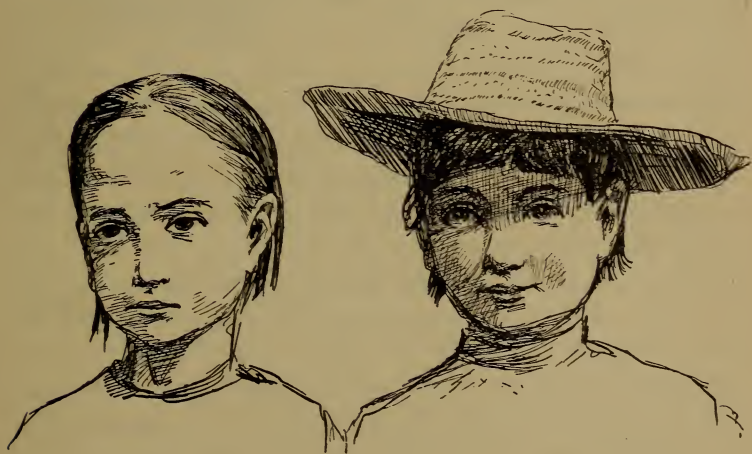


there is very little to be seen through them except blank walls, clothes-lines, and here and there a cat or dog.

6. From some of these rooms you can not see the beautiful blue sky, nor clouds, nor a rainbow. In such houses as these the sun gets no chance to peep into the rooms to point out the dirt, and make people cheerful and happy, and put color

into their faces. Sometimes people live in dark cellars, or in rooms partly underground. Here is a picture of a house, in the dark basement of which a family dwelt, and called it home.

7. Some of you may say you know of houses in which people live who are not poor, where the sunlight is kept out of rooms, for fear it will spoil the furniture, and the people are pale and look unhealthy, and are so nervous that they easily lose their tempers, and learn to look on the dark side of things. Yes, and these people are likely to lose their appetite for healthy food; and sometimes, because people are down-hearted, they fall into the habit of drinking



liquors to drown their sorrows, as they say, but alas! they may drown their souls instead.

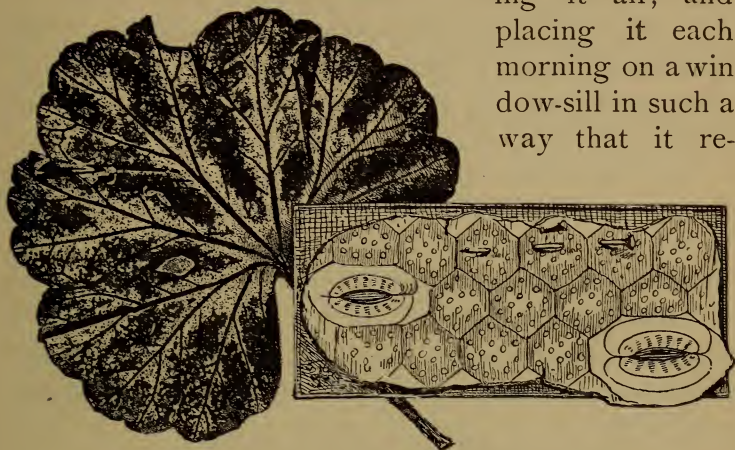
8. Here are two drawings that have been made

for you from photographs. The first shows the face of a little girl as she looked when just rescued from some cruel people, who had kept her for a long time in a house where she did not have enough light and air, although she had enough to eat, and nearly enough to wear. The second shows the same child, after she had been properly cared for, by kind people, for a month; having had an abundance of good air and clothes, warm sunshine, and suitable food.

9. The darkness of night is best for rest and quiet; but to have our rooms dark in the day-time, and also dirty and filled with bad air, is to spoil our appetites, strength, feelings, and looks. Have you ever tried to keep plants in your rooms, and have you learned that in the dark they don't do well? Not only do they want sunlight, but the little mouths in their leaves must be open, and not stopped with dust, or else they can not drink in the air which is needed for the life of the plant. In the picture is a piece of the under side of a geranium-leaf, highly magnified to show the leaf-mouths.

10. It is a good thing to keep plants in your rooms, for they will teach you many things, and the plants help to make the air pure. It is said that in an overcrowded tenement lived a little crippled girl who was pining away, because of bad air, darkness, insufficient food, and want of exercise. Flowering plants were given to the children living in this house, and a prize offered to the one who should have the most healthy-looking plant after a month or two. The crippled

girl received a fuchsia. Tenderly she cared for it each day ; watering and keeping the plant clean, giving it air, and placing it each morning on a window-sill in such a way that it re-



ceived the light of the early morning sun. The plant, under this treatment, grew strong and beautiful ; while many of the plants, not so cared for, faded and died. The rising sun and the fresh morning air revived the spirits and health of the little girl, and that was a greater prize for her than the money prize she received for her beautiful plant.

11. It would be hard to live without plants and trees, for they consume some of the poisons found in the air, and so help to keep it pure. The carbonic-acid gas and other things bad for our breathing are swallowed by the plants through their leaves, and really build up the plant-life ; in turn, they send out a gas known as oxygen, which man and all other ani-

mals breathe, and which goes into the blood, and helps to furnish life and health. Children, as well as grown people, can do much good in the world by encouraging the planting of trees, and keeping those that are growing in good condition. Unfortunately, there are parts of our cities where there are no trees.

12. Gas, fires, lamp and candle flames, especially if they smolder, and do not burn well, give out poison to the air. Poisonous material is thrown into the air from our skins and clothing. Food, by spoiling, helps to make the air impure. In some houses, even in hot weather, open dishes of butter, meat, and milk are carelessly left on the sills of windows opening into hallways.

13. Dirty walls and ceilings, soiled clothing and bedclothing, make our rooms smell musty, or what some people call "stuffy." Even the cleanest room, when kept closed for a number of days, has a close, unpleasant smell, which, when once perceived, should be got rid of by letting in fresh air from out-of-doors. Close, dirty, bad-smelling rooms make worse such diseases as measles, scarlet fever, and diphtheria. It is just as if the bad air were a cruel giant, who said, "These people will not use plenty of air and light, even when they can procure them, so I will send out my little imps of darkness and disease, to destroy the plants and flowers, and to bleach out the skins of such people, and make their blood poor."

For Recitation.

1. How are sunshine and good air important for human beings and pet animals? Without them human beings and other animals gradually lose the desire to move about, and so lose health and strength?

2. What helps to make the faces of people, and the leaves and stalks of plants, pale and sickly-looking? Darkness, especially if with it is bad air.

3. Why should we not live in dark rooms, houses, or streets? Because by so doing the blood is made poor.

4. Are trees and plants of use to us? Yes; they take into themselves some of the poisons in the air about us, and give out gases which our blood needs.

5. What diseases spread most rapidly where there are darkness and bad air? Scarlet fever, diphtheria, and other contagious diseases.

LESSON IV.

Breathing—Voice—Air-Supply.



ALREADY some of the children are asking what does he mean by breathing; how can air outside the body affect the blood inside the body? Breathing is taking air into the body, through the throat and lungs, to purify the blood, and also sending out air which has been used, and is full of impurities.

2. The tadpole, or polliwog (which, as some of you know, develops into a frog) breathes through its gills, which are little sacs branching out from the sides of the head, as in the picture B. These sacs are covered with many small blood-vessels filled with blood. As the tadpole swims about, these blood-vessels cast out into the water the impurities which they have brought from the inside of the body, and the blood becomes pure and of a bright-red color from the oxygen gas in the air, which is always found in water in which plants and animals live.

3. As the tadpole begins to lose its tail, and its legs crop out, the gills gradually disappear, and when the tadpole has become a frog, there are in-

side the body what we call *lungs*, or in chickens and turkeys *lights*. These are large bags or sacs (shown



at A in the picture), which connect with the mouth by tubes. These sacs are divided by strong elastic walls into many little rounded rooms or cells. These are covered with blood-vessels.

4. The air comes into the many rounded rooms through the throat, wind-pipe, and branching pipes,



Section of Frog's
Lung.

called air or bronchial tubes. It gives purity to the blood in the blood-vessels, and receives carbonic-acid gas, and waste material from it, to be thrown out from the lungs through the nose or mouth. Why does the frog need such lungs? Because he is now to live on land as well as in the water, and will be larger and more active than he was as a tadpole, so will need more air.

5. Our lungs are much larger in proportion to our size, and have many more rounded rooms, than the lungs of a frog, because we are to do much more work in the world. Instead of having only two large bags or sacs with rounded rooms, we have many small ones which we call lobules. From each lobule there goes out a very small tube, which joins with similar ones from other lobules, making one large tube. This large tube unites with others of the same sort into one still larger, and this in turn joins one of its own size to form the windpipe or trachea, which opens into the throat. This arrangement of lobules, little bronchial tubes, large bronchial tubes, and windpipe, is very much like the arrangement of the leaves, twigs, branches, and trunk of a tree.

6. At the top of this windpipe is the *larynx* or

voice-box, through which the air passes in breathing, and in producing voice-sounds. In the larynx are two little bands called *vocal cords*. Voice-sounds are produced by the air passing between them, as their edges approach one another or move from one another. Pressure on the front of the neck by tight collars or bands will affect the voice and cut off some of the precious air that ought to go into the lungs.

7. It is well for you to know where the voice-box is, and that the opening between the vocal cords for the air to go in and out is very small, and the inside of the voice-box is very sensitive. So it is a good habit *to talk slowly*, and in a *low voice*, and not to stutter or scream, for frequent loud talking, and crying, will be likely to make your voice rough and hoarse.

8. Your teachers of elocution and vocal music, knowing how important it is for children to train their voices slowly and gradually, if they want them to be strong and flexible, give you exercises to repeat, which *they know* will help you, and which *you* sometimes *think* are tiresome and of no use. Your teachers might also tell you that smoking, liquor-drinking, wet feet, and draughts of cold air, injure your voices and sometimes damage your lungs.

9. We should breathe through the nose, just as a healthy baby does. A baby when asleep lies so quietly with the mouth closed, breathing through the nose, that you hardly know whether or not it is alive. The nose inside is so warm and moist that cool air

coming into its passages is warmed before entering the lungs, and some of the dust in it is prevented from going into the lungs.

10. Persons who keep their mouths open a large part of the time are likely to snore when asleep, and the air admitted dries the mouth and induces disease. Indian mothers are very particular to keep their children's mouths shut in sleep, and teach them to keep them shut when running about and playing, which partly explains the Indian's strength of lungs and his great endurance. If you keep your mouth shut and breathe only through your nose, you can venture out-of-doors for a whiff of fresh air in the very coldest weather; and one is better for a little out-door air each day, no matter how well aired his house may be.

11. The fact is, to keep our rooms well aired or ventilated, we must have plenty of air come into them each day from *out-of-doors*, instead of from hallways, other rooms, or cellars, where the air is very likely to be impure. Go out-of-doors every day you can, but keep warm in cold weather by being warmly clad, and by moving about quickly. After having been out-of-doors for some time you will notice if the air in your rooms smells bad, but if you stay in the house most of the time you will not notice bad smells, and will be poisoned without knowing it. If you are wise, whether your nose tells you of bad smells or not, you will open your windows wide for a little while each day, and let the air blow through the rooms.

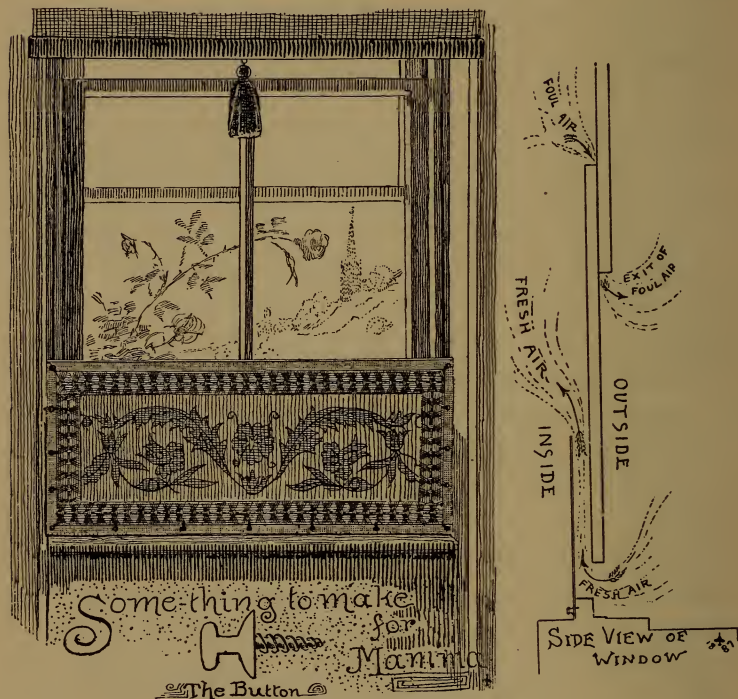
12. In schools, especially if the rooms are small,

and there are many children in them, it is important for health and comfort that the children should go out-of-doors at recess, except in very stormy weather, that the rooms may be aired. If in winter a person must stay in a room while it is airing, he should walk around, or be warmly wrapped in a blanket or overcoat, or a shawl, and the wrappings should not be removed till the room is warmed again.

13. In much-used rooms, or in large, overcrowded ones, one window should be open nearly all the time. It is well to place a board on its edge under the whole width of the lower sash. The air then enters the room where the upper part of the lower sash passes the lower part of the upper sash, and so does not blow directly upon people in the room. In cold or windy weather, when the cold air forces its way through every crack, it is not well to sit very close to the window nor door, unless the room is very warm.

14. Another way of letting air into a room is to raise the lower sash, having first fastened to the lower part of the window-frame, on the inside, a piece of strong cloth about one foot in height, the ends of the cloth being fastened to the sides of the frame by thumb-screws, as in the picture, or by rings sewed upon the edges of the cloth, and passed over little hooks in the window-frame. This piece of cloth you can make pretty on the inside, outside, or both, by painting on it flowers, leaves, fruit, or birds. When it is in position, and the lower sash is raised,

the air blows into the room and up over the cloth without blowing directly on persons within, even if a door is open. These two ways of airing a room



cost but little, and can be used in any house, large or small. The airing will be more complete if the room has in it an open fireplace.

15. When the winds don't have a chance to carry off the dust, little bits of hair, meat, cotton, wood, etc.,

that are in it, as is the case in many houses, people breathe in these things in large quantities, and injure the lungs. The fathers and mothers of some of you have learned that when you are restless in your sleep, toss about, and throw off the bedclothes, the air in the room may be growing impure, and your lungs don't like to breathe bad air, so a window is opened, and you fall into a sweet, quiet sleep. Have plenty of fresh air in the house, but avoid draughts which "cut like a knife"!

16. There is always some cold air in a room moving along the floor toward the stove or fireplace, if a door is open. So it is not well to sit or lie on the floor at such times. On account of this current of air along floors, some people take cold if they wear slippers.

17. Sunlight and good fresh air will do wonders for us, if we will only let them. On the next page is a picture of some tenement-houses that used to have others close to them at the back, thus shutting off the light and air. The rooms were dark and dirty, the people in them sickly, and given to drunkenness and crime. Now all is changed. A lady bought these miserable houses, tore down the buildings in the rear, let in the light and the air, had the rooms put in good order, and planted flowers in the yards. Now the children are clean and happy; would rather play in the yards than in the streets; and in the houses, what a change! I must let you imagine how great is the improvement.

18. Every summer many sickly and puny children, and tired-out mothers, go to the sea-shore for a



week or two as guests at some sea-side home. There, on the beach and the broad piazzas, arranged to afford plenty of air and light without the glare and great heat of the sun, and with the aid of good food, they

become different creatures. Yet so strong is the force of habit that some of these very people will go back to their houses in the city and live again in dark and dirty rooms. Now that you children know what air and sunlight will do, it is your duty to tell others about it, as well as to remember it carefully yourselves, and try to live accordingly.

For Recitation.

1. What is breathing? It is the taking of air into the body, and the sending out of air from the body.

2. What is breathing for? To purify the blood. The air that goes into the body carries to the blood oxygen gas, and the air that comes out brings with it from the blood carbonic-acid gas and other impurities.

3. What are the principal organs of breathing? The nose, throat, windpipe, and lungs.

4. What part of the body enables us to produce voice-sounds? The larynx or voice-box at the upper end of the windpipe.

5. Why do teachers of music and elocution drill pupils on exercises which at times seem tiresome to children? Because by such exercises the voice is trained or made stronger.

6. What interferes with the action of the lungs? Living in bad air, and the use of clothing that is tight about the neck and chest.

7. Why should we breathe through the nose? Because in this way the air going to the lungs is warmed, and rid of some of its dust.

8. Why should we draw our supply of air from *out-of-doors*? Because the air in our houses becomes easily poisoned by gas and lamp flames, tobacco-smoke, and in many ways.

9. What do we mean when we say our rooms should be ventilated? That they should be well aired.

10. How do sunlight and fresh air do good? They improve the condition of the blood.

LESSON V.

The Use and Abuse of Food.

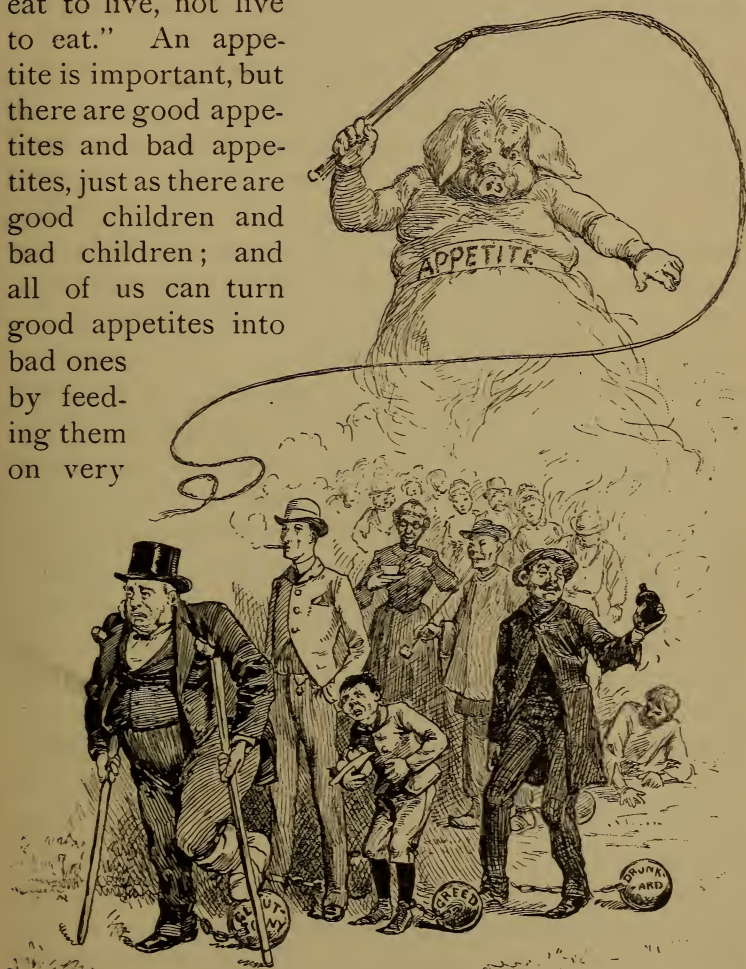


OW that you know that neither you nor your puppy can live for five minutes without breathing, and that your doll never breathes, you probably want to know something about food. Some of you had thought nothing about air but much about food, though you really knew but little of the use of food.

2. But of what use is food? Well, without it the blood that was in your bodies when you were born would grow less and less, and finally shrink away altogether. No new blood would be made to take the place of the old, which would have gone into every part of the body; so these would grow dry and useless. If you should break your arm or your leg, there would not be blood enough to mend it—that is, to pour out material between the broken bones and muscles to hold them in place, until more blood could make new bones and muscles.

3. Says some little boy or girl, “I thought food was to eat because it *tastes* good.” No, the appetite for food was born in you to make you eat enough to

keep you alive, and make you *grow* and *develop*. "We eat to live, not live to eat." An appetite is important, but there are good appetites and bad appetites, just as there are good children and bad children; and all of us can turn good appetites into bad ones by feeding them on very



Slaves to appetite.

sweet or sour or rich things—that is, letting them have their own way, just as often good children become bad by having *their* own way.

4. I would be sorry to know of any child who has never tasted good, pure candy; but I would also be sorry for a child who wants to eat candy and sweetmeats, when he ought to eat good bread, milk, oatmeal, eggs, meat, fruit, and vegetables; for these last things mentioned make the best blood in the shortest time. However good, candy, cake and pie may taste, if we had to live on them alone for a week or more, we would be like the little girl, told of in “St. Nicholas,” who lived in the *candy country*, where everything she ate was candy. Oh, how soon she became tired of it, and was glad to get back to good bread and milk!

5. Children who eat very largely of sweets, and use very little milk, ripe fruits, and vegetables, or who want to make a whole meal out of one kind of food, simply because they are fond of it, or, as they say, because they “*love*” it, are finical or greedy children, and they never ask whether the thing they like likes them. So they eat pickle after pickle, sweetmeat after sweetmeat, cake after cake, until the stomach will not stand it any longer, and begins to ache. Then comes a dose of medicine, not always pleasant to take.

6. There are some children who go on, week after week, having stomach-aches, and taking medicine, before they will learn that the *best* thing to do is to be careful. I know of several children who will eat

quantities of sweet things, but who pick at proper food like little dainty birds, and who pout whenever told to eat what is good for them. Perhaps if they knew that the proper food would give color to their cheeks, brightness to their eyes, and strength to their bodies, and that sweets and other dainties destroy the brightness, the color, and the strength, they would act more wisely.

7. What do you think of children who will not eat griddle-cakes unless loaded with sugar, or who must mix sugar and water with the milk they drink; who dislike oatmeal, stewed potatoes, and the like, because they are "soft things"; who refuse to eat what they know will do them good, simply because they think it will make them *too fat*, like some other child of their acquaintance? We all want to learn, as far as we can, to eat a *variety* of food, so that wherever we may go we shall find something to eat that we like and that is good for us.

8. Children, and grown people as well, sometimes wonder why they can't eat, as most of the lower animals do, when and what they please. The fact is, that such animals seldom eat too much. Very seldom do they eat or drink what is hurtful or poisonous, unless they are forced to it by human beings. People frequently eat too much, and are so anxious to eat, that they do not examine their food as they should, and so are made sick, from unripe fruit, or from dirt or poison in the food from unclean kettles, saucepans, and dishes.



9. When all the girls learn how to cook nicely plain, every-day food, and to keep the food and the dishes it is cooked in and eaten from clean and sweet, and all the boys learn what is good food and how to buy it, fewer people will be poisoned than now are. Before closing this lesson, let us review what has been taught, and enlarge upon the topics if necessary :

10. We eat food to make blood, and it is right to have it taste good, so that we will eat enough of it.

11. A *healthy* appetite will show us what is good for food. We can spoil our appetites by living indoors, by not taking enough exercise in the open air, by eating too much of sweet or rich things, and by smoking, or by drinking alcoholic liquors ; when spoiled, they are not able to tell us what we can eat with safety, so we get "*sick all over*," as people say, and have to take medicine.

12. When we are no longer babies, we can eat something besides bread and milk ; and we should not eat too largely of one kind of food and leave other good kinds untouched. Go to the large markets and see what there is to eat ; you will find many kinds of vegetables and fruits, besides meats, and food made from the grains ; oatmeal, wheaten-grits, flour, etc. Learn to like many of the plain, simple foods (milk especially is good), and to eat only occasionally of candies, pies, cakes, and sweet-meats.

13. Don't be fastidious nor greedy. Don't dislike a food without a very good reason. I know children who used to dislike tomatoes, egg-plant, parsnips, stewed fruit, oatmeal, milk-toast, and even ice-cream, and who now like them simply because they have made up their minds to *try* to like them for their own comfort and to please others. Begin with a very little of the thing you dislike; eat it occasionally, and gradually more and more of it, till finally you like it.

14. Learn to cook common things in many ways; to be clean about your cooking, and to put food on the table looking nice; and all this certainly can be done, even in the poorest families. Persons who can't eat potatoes boiled with their skins or jackets on, may like them baked, stewed, or cooked with meat. Food should be clean because it is easier for our stomachs to dispose of clean food, and because we want to make it attractive to people with sensitive or "delicate" stomachs. The food should be nicely served, and the table neatly dressed, even with the plainest food or the least variety. Dirty or spotted table-cloths or napkins, sticky spoons, knives, and forks, greasy dishes, thick slices of bread, are not necessary, and spoil the relish for food.

15. An old gentleman told me that when he was a little boy a rich man of the neighborhood came to take supper with his parents. The mother was worried, for she had but little in the house to eat, and the rich man was accustomed to an abundance. But like a sensible woman she did not despair. Every-

thing on and about her table was clean and neat, but there were to eat and drink only good biscuits, pure honey, good water, and hot tea. The gentleman ate and ate, and enjoyed himself. It is not always the amount or variety of food which makes an enjoyable meal; it is more the way the food is cooked and served.

For Recitation.

1. What is the principal use of food? To make blood.
2. Could you grow without food? No, our bodies would shrink and dry up.
3. What if you should be starving, and should break your arm or leg? My blood would be so poor that the bones would not readily unite.
4. For what is an appetite given you? To cause me to like food, and eat enough to grow and develop—in fact, to live.
5. How can you spoil your appetite? By eating largely of rich or sweet things.
6. Should candy be eaten? Sometimes, but not to take the place of bread, meat, and vegetables.
7. Should you eat what you know disagrees with you? No; for, though it is pleasant to the taste, it may cause me pain and illness.
8. What effect has proper food? It gives color to the cheeks, brightness to the eyes, and strength to the body.
9. Will improper food do this? No, it weakens one and makes him ill.
10. How can you learn to relish foods which are good for you and which you now dislike? By eating them at first in small amount, and gradually increasing the quantity.

LESSON VI.

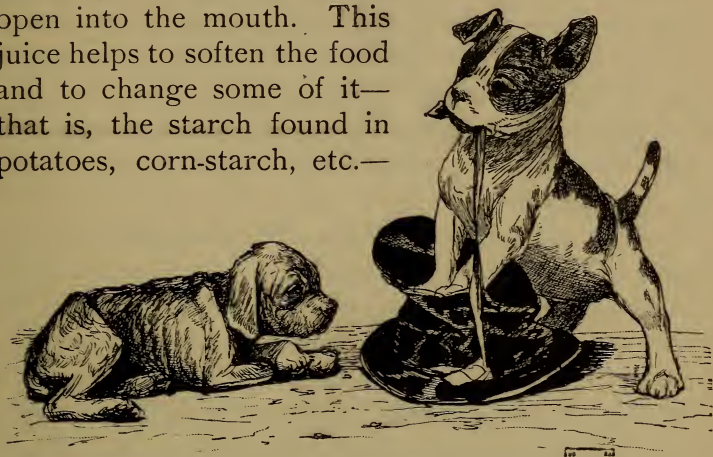
How Food becomes Blood.



SUPPOSING we have healthy appetites, and use them well, how does the food do our bodies good, and how is it changed into blood? When the food is taken into the mouth, the first thing we do, or ought to do, is *to chew it*. Strange as you may think it, there are people, children and grown folk alike, who seem never to have learned how to chew; and, because they don't chew their food, it goes down in lumps into the tender stomach and causes stomach-ache, and sometimes vomiting, with other and worse troubles.

2. If we don't chew our food, the teeth, whose duty it is to chew, are likely to become soft and to decay. If we want hard, sound teeth, we must use them. When puppies are fed on sweets and soft, dainty food, their teeth soften and are of very little use, and the puppies are not bright and active. But when fed at first on milk, then on firm food, and finally given bones to gnaw, the teeth become hard and sound, and the animals are in good condition.

3. Again, if we don't chew, we don't squeeze out enough juice—that is, *saliva* or spittle—from the bags or glands which open into the mouth. This juice helps to soften the food and to change some of it—that is, the starch found in potatoes, corn-starch, etc.—



into a sort of sugar. It must be so changed before it can go into the blood. In fact, the mouth, with its teeth and glands, is the mill or grinding-place, where the food is made smaller and prepared to go into the rest of the factory to be further changed, so that the teeth should be in good condition, and the saliva should not be wasted by useless spitting, such as the use of chewing-gum induces.

4. Babies seldom have teeth at birth. They don't need them, because their only food is, or ought to be, milk. In a few months, pretty little white teeth begin to show themselves in the mouth, one after another; and, when the child is two or two and a half years

old, there should be *twenty* teeth. These are called baby-teeth and milk-teeth, because they begin to come in babyhood. Gradually these first teeth fall out, and the second teeth, *thirty-two* in number, which are to do duty for the rest of life, push themselves out from their beds in the jaws, where they have been resting all along. They then take the place of the first teeth, and begin to work and to grow strong if we take care of them.

5. The way to take care of our teeth is to use them; to pick out particles from between the teeth by the aid of quill or wooden tooth-picks, and not with pins, needles, or knife-blades; and to keep them clean by rinsing out the mouth frequently with pure water, by brushing them night and morning with a fairly stiff brush and water, or good soap and water, or prepared chalk from the druggist's. In most class-rooms, if the teacher were to ask how many children brush the teeth once a day, quite a number of hands would be held up; how many twice a day, fewer hands would be held up; and I am afraid that there would be some children who would have to own to never brushing their teeth.

6. After the food is ground up and softened, it is ready to pass down into the body through the throat into the "red lane"—that is, the *gullet* or food-pipe—which leads to the stomach. The throat, which begins at the back of the mouth, is in shape something like a funnel, but surrounding it are muscles which are to help the food down-hill, at first letting

it go slowly and then fast, when it is safely on its way. You can see the throat and the little curtain which hangs down in front of it and toward the back part of the tongue, by looking into your open mouth through a looking-glass.

7. Draw in your breath strongly, and at the same time place your right fore-finger on the tongue, with the tip of the finger far back, and you will readily see the throat. If you learn to do this easily when well, you will not need to have a spoon to hold down the tongue when your throat is sore. Above and behind the soft palate, or the hanging curtain, where you can not see them, are two openings into the back part of the nose. If we eat or drink too fast, especially while laughing hard, the food or drink "goes the wrong way," either up into the nose through the two openings or down into the tube which leads to the lungs, in which case we cough and splutter or choke.

8. The toad swallows without chewing, but we are not toads. The cow chews her food or cud, but only after the food has been hastily swallowed, has gone through two stomachs, and has been thrown up into the mouth. We can not eat in that way. Drink will do us most good when thirsty if we quietly sip it, not gulp it down. Some people, who think the manner of eating is not of any consequence, hurry through their meals, and bolt their food, and guzzle their drink. Such conduct always reminds me of the sea-lions in Central Park. They raise their heads, open their mouths, and catch the whole fishes the keeper

throws to them. Down the fish go into their stomachs with one gulp.

9. The gullet, or *œsophagus*, which leads from the throat to the stomach, is very smooth inside, and is surrounded by muscles, which squeeze food and drink along into the stomach, even if the person swallowing is standing on his head. After the food once gets fairly into the gullet, we can not generally stop its going down into the stomach.

10. And what is the stomach like? Some children have thought it was like the gizzard of the chicken, rough and hard, to grind the food. Others think it is like a bag of some sort into which can be put at any time, in any way, meat, gravy, potatoes, bread, candy, and fruit, which will take care of themselves. Yes, it is something like a bag in shape, but it is beautifully soft inside, soft as velvet, and has muscles outside to keep it moving when not empty.

11. Whenever there is food in the bag, it is squeezed by the muscles from side to side, and end to end, until the food is all churned together. At the same time a sour juice is poured into the stomach from glands or little bags in the walls of the stomach, which helps to soften and change the food still more. Then some of the soft food, like very thin gruel, passes through the walls of the stomach out into many little tubes, called *lacteals*, because when filled with the fluid they look white, like milk.

12. These tubes carry it into larger tubes, called *veins*, when it becomes a part of the blood, and is

emptied by the veins into the heart. The rest of the food is pushed out at the lower end of the stomach into the small intestine—that is, if the little round curtain, called the gate-keeper, at that end of the stomach, will allow it to pass. This gate-keeper doesn't like to let hard things pass by it, so there is often a struggle between the stomach and its gate-keeper, the stomach trying to squeeze out the hard lumps so that its owner won't have the stomach-ache, and the gate-keeper trying to hold them back, so that they won't go into the small intestine, and cause pain there.

13. You see, the stomach, like the throat and the gullet, don't like to have to work with hard food and big mouthfuls, and neither should they, for it is the duty of the tongue and teeth, and cheeks and saliva, first to break the food up and make small mouthfuls of it. The stomach must also be kept delicate and warm, if it is going to be able to churn all the food that is put into it, and to squeeze it all out when necessary. It is well, therefore, to wear warm clothing over the part of the body where the stomach is.

14. If we drink ice-water frequently, or if we gulp it instead of sipping it, we are very likely to cool the stomach so much that it is numbed, and can't move quickly. Then stomach-ache and suffering follow. If we get into the habit of using mustard, horse-radish, and strong sauces, but especially the strong drinks I told you of, the stomach becomes hardened,

and in the case of habitual drunkards, thickened like a leather bag, "a good stomach to hold alcohol, but a poor one to digest food." The stomach, like all parts of the body, also needs rest. If we eat between our meals, whenever we fancy we are hungry, we may overload the stomach and cause pain, vomiting, gas, and diarrhœa.

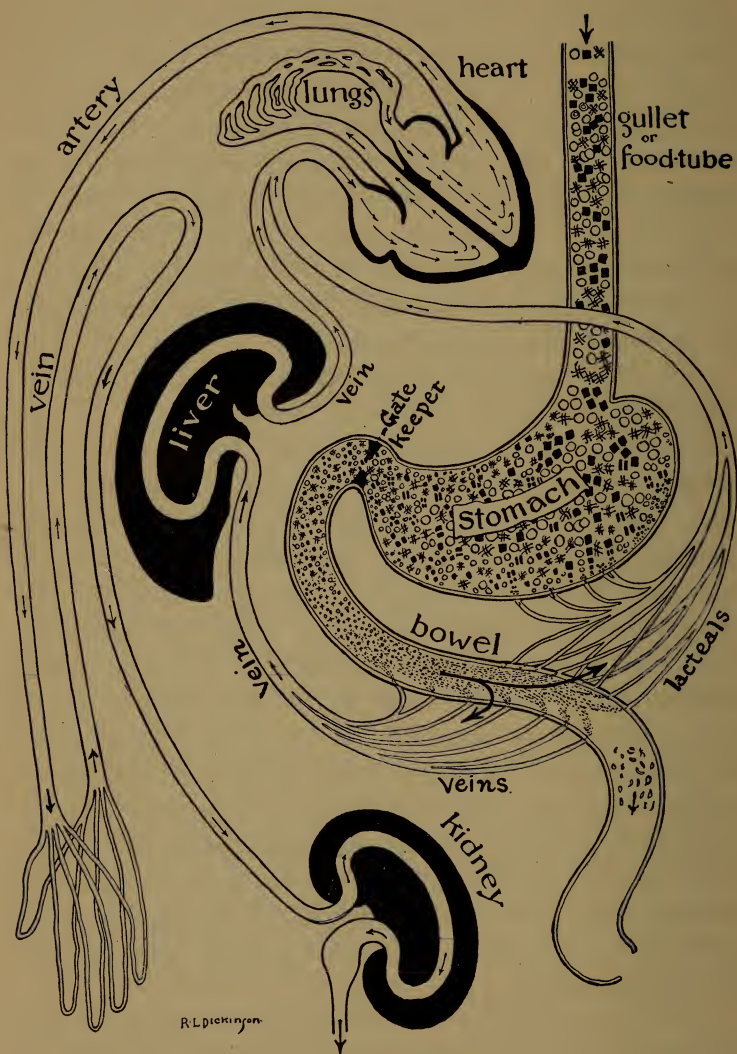
15. Where does the food go that passes out of the stomach? Into the small intestine. This intestine is a tube about five times the length of your body, is very soft inside, and is surrounded by muscles. Into it juices come from little glands in its own walls, and also from the liver and the pancreas, two organs near the stomach. These juices, the *intestinal juice*, *bile*, and *pancreatic juice* break up the food in the intestine, and so change it that it becomes liquid, looks like milk, and is called *chyle*. By the movements of the intestine, the chyle is squeezed out of its walls into lacteals and little veins, and some of it is carried through the liver to the heart, and some reaches the heart in another way.

16. So you see, if everything has been done as it should be, our food has been chewed in the mouth, rolled into wads or balls, softened by the saliva, and part of its starch changed into sugar, then swallowed, churned in the stomach, still further softened, and partly changed, while some of the water and the salts in our food—that is, common salt and other kinds—have passed by little vessels into the blood. Then the pulpy mass passes the gate-keeper and goes

into the small intestine, where most of the food is made very soft, and most of it is ready to become blood. After the food has passed through the walls of the stomach and the small intestine, exactly in what part of the body it becomes blood we do not know—we do know that when it has reached the heart it *is* blood, and is carried to all parts of the body—the sugars, fats, and starches giving us most of our fat and warmth, and the other kinds of food giving us most of our strength.

17. The artist has here drawn for me a sort of puzzle by which you can see what becomes of the food. The little black squares represent bread, potatoes, and food which contain starch; the circles, meat of various kinds, and similar food-substances; the crosses, water and salts. You see how they are all jumbled together in the stomach, and how they grow smaller as they enter the small intestine or pass out of the stomach. You see how some of them get into the blood and then into the heart, directly by the lacteals, and how others have to go through the liver first. Once in the blood, their distinctive shape is lost. As blood they go through the lungs to be purified, and then into an arm (but in the same way the blood goes to the head and *all* parts of the body) and back again, its waste material to be thrown out of the body by the kidneys or other channels.

18. What becomes of the material, such as the skins of apples, the seeds of berries, and the stringy



parts of oranges, etc., that doesn't change into blood? The gate-keeper allows them to pass, because, although they can't well be broken up and softened to make blood, they are of service at times. If not in too large a quantity, they excite the intestines to move, and so hurry on the blood-making process, and at the same time get rid of dead material which passes into the large intestine.

19. This large intestine is like a sewer in a city, carrying off things, which, if allowed to remain, will sour and decay, and cause ill health. So you see the importance of keeping this sewer of ours clean. In cities, when sewers do not carry off the refuse readily, the authorities at times pump quantities of water into them, to "flush" them, as it is called. How much better it is for us to eat the right kind of food and drink good water and milk, instead of constantly having to take castor-oil, salts, or senna, or some other medicine, which often tends to injure the health!

20. Wine, beer, and all such liquors, are very apt to hinder the stomach and intestines from moving as they should, and prevent the softening and changing of the food into material for blood; and people who drink much of them think that they must use much opening and cleansing medicines, and thus add danger to danger, and misery to misery, and shorten their lives for the sake of pleasing their appetites.

For Recitation.

1. Why is it important to chew food? Because chewing breaks the food up so that it can be easily swallowed, and it also keeps the teeth strong.

2. What softens hard particles of food while we are chewing them? The saliva or spittle.

3. How many sets of teeth are there for each person, and how many teeth in each set? Two sets—the first has twenty teeth; the second thirty-two teeth.

4. Why is it well to chew and to swallow food slowly? Because, if we act in this way, our food will most easily turn into blood, and we will not be likely to eat too much.

5. Why should we not drink much ice-water? Because it will make the stomach cold, and prevent it from moving promptly when food goes into it.

6. Why do the parts of the body that digest food move when food is in them? To thoroughly mix the food with digestive juices.

7. What will interfere with this important work? Tight clothing about the waist and over the stomach, and drinking much ice-water or alcoholic drinks.

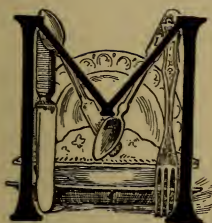
8. What becomes of the food in the stomach and small intestine? It is changed into a white fluid called chyle, and passes into the blood, of which it becomes a part.

9. Of what particular value are the different articles of food? The sugars, fats, and starches give us most of our fat and warmth, and the other kinds of food most of our strength.

10. Of what use are the coarser parts of food? They excite the intestines to move.

LESSON VII.

What to Eat.



MORE than one bright little girl is asking by this time, "Well, if it is so important to eat right things in order to have good blood, I should like to know what there is in the world to eat." A good many things, my dear. Probably at some time or other almost every kind of animal and plant has been used as food.

2. People have managed to live on grass, leaves, and the twigs of trees, and when driven by famine have been compelled to eat the leather from their shoes. It is well to know that we *can* live on such things for a short time until relief comes to us, though we don't want to have to do it. It is also well to know that we really need but very little food to keep us alive and well, much less than most of us eat.

3. Food is generally spoken of as animal food, vegetable food, condiments, and drinks. *Animal food* includes the flesh—that is, the muscles or lean meat of birds, fish, and four-footed beasts, together with the

fat and blood-vessels found among or about the particles of meat. It includes also eggs and milk, and some of the inner parts of animals, such as parts of the stomach, liver, and kidneys. "But," you say, "milk is something to drink." Yes, that is so, and a very important drink it is, but it is also a very important food, especially for children. People sometimes say that a baby *had only a sup of milk*, just as if milk was not *enough* food for most babies! So good a food is it that grown-up folk have lived on it for many days.

4. I trust you will all have plenty of good sweet milk to drink, and that when you grow up you will do all you can to prevent people from putting water in the milk they sell, or from selling milk that is not sweet and pure. It is best to drink the milk slowly. Once in a while we meet with children who don't like milk, or who say they don't. Let them try hot milk poured over little pieces of bread, and seasoned with salt and pepper; or a light cup-custard, or begin with a wineglassful of milk, and increase the quantity gradually day by day until they can drink a tumblerful.

5. *Eggs*.—Many children like eggs, but some do not. Some like to eat them hard-boiled, but eggs cooked in this way often disagree, and so give them stomach-ache. It is a great deal better to eat eggs soft-boiled or scrambled, or made into omelets. If you do eat a hard-boiled egg, eat some bread with it, and chew it well, so that the stomach will not feel bad from having hard lumps put into it. Because an

egg is not a very large thing, I have known people to eat several of them at a meal, and every day for days together, until the liver and stomach grew so tired of trying to change them into blood that the machinery got out of order and the eaters became sick. Not more than two or three eggs at one meal should be eaten by any child.

6. *Meat*.—Most children like meat, and very often they eat too much. It is safe to say that it is best for you not to eat it oftener than once a day, and then at midday, if you can, or once in every other day, is often enough in summer. Every kind of meat needs to be well chewed. Men and women, and large boys and girls, who do hard work require more meat than children. But with the lean of meat a little fat should be eaten. Now, I can see some of you turn up your noses at the idea of fat. This shows that you don't know that meat which does not have streaks of fat through it is tough meat, hard to chew, does not taste as really good meat should, and is hard for the stomach to digest.

7. A little piece of tender lean meat (i. e., lean with a little fat) is better for most of us than a large piece of lean meat with little or no fat. Jack Spratt was very foolish to eat *all* the lean, and his wife to eat *all* the fat. How much better it would have been for both of them to eat some fat and some lean! Children who don't eat fat are very likely to suffer more from the cold, to catch cold more easily, and to be more readily exhausted than those who do.

8. *Butter*, though it is fat, and probably gives more warmth than strength to the body, is an animal food. It is not necessary to hold buttercups or dandelions under your chins to find whether you like butter or not, for most of you do. But for some families butter is too expensive, and can not be used frequently ; and it is in such families especially that other kinds of fat should be eaten. Because good butter does taste good, people are likely to eat too much, and thus to make the blood too rich, and so they have spots or pimples upon the skin, and lose some of their strength.

9. Though most of you like lean meat and butter, very many don't like soups and broths. Yet these have in them the juices of the meat, with some fat and some rice or barley. Such food is very good for you. American children do not eat enough soups and broths, which are healthy and cheap, but German and French parents well know how useful such food is for their children.

10. *Vegetable Food* includes every part of any plant that can be used as food—roots, such as potatoes and turnips ; stems, such as celery ; leaves, as spinach and lettuce ; fruit, as apples and oranges ; nuts, as hickory nuts and walnuts. The most important food of the vegetable kind is grain—that is, the product of the wheat, oat, rice, and barley plants, and others of that kind. Food from the grains is the most important of all the vegetable foods, because of them flour is made, and of the flour bread is made. Some are crushed

into "grits," or ground into meal, so we have wheaten-grits, oatmeal, or flour, corn and rye meal, or, if the meal is very fine, wheat and rye flour. Too many of us in America use only white wheat-bread, and do not touch rye, which sometimes has caraway-seeds in it, nor brown or Graham bread, nor bread made with oatmeal.

11. Bread is so leaned upon to keep people alive that it is called the "staff of life." Butter goes so well with bread that some one has called it the *golden head of the staff*. Some bread should be eaten at each meal, not only because it is a good food, but because chewing the crusts helps to keep our teeth in good condition. Then, too, if we eat bread we don't eat so much of other things that our stomachs don't like so well; and, moreover, bread entangles itself with the small seeds of fruit we may eat, and often prevents them from doing harm.

12. I did not tell you, when talking of the small intestine, that close by where it empties into the large intestine is a little tube, about an inch and a half long, which opens into the large intestine also. What this is for, no one seems to know. It is known, however, that if people eat a large quantity of fruit with small seeds, unless these seeds are mixed up with bread or other food, they are likely to get into this little tube, and, because they can not get out, the parts grow sore, and persons have been known to die in consequence.

13. Among the vegetables used as food you all

know what the white potatoes are, sometimes called Irish potatoes, because in Ireland they are used very largely, being easy to raise. Some of you know very little of any other kind of vegetable. And if you do, very few of you like carrots, cabbage, greens, lettuce, squash, string and Lima beans. You do like sweet-potatoes and corn and radishes. Probably you eat more of these than your stomach will take care of, but you turn up your noses at carrots, and think them fit only for cows to eat. You don't consider that God has put a variety of vegetables into the world so that we may have many to choose from, and are not compelled to live only on potatoes.

14. You may not know that the green vegetables, such as onions, lettuce, greens, water-cress, and celery, are especially good for us in the spring, when, after the richer food of the winter, our blood needs certain juices found in these vegetables and in fresh fruit. In old times most people thought it was necessary to take, especially in the spring and fall of each year, sulphur and molasses, or some such medicine, "to clear the blood." Such medicines are used now-a-days by some people. Surely, the eating of fruit and green vegetables is an easier and a pleasanter way of clearing the blood. In the market-scene before you the artist represents twenty-six different kinds of vegetables. Try to point them out. There are onions, egg-plants, artichokes, tomatoes, peppers, sweet-potatoes, white potatoes, squashes, celery, small round radishes, sugar-beets, asparagus, kohl-rabi, turnip-radishes, cu-



cumbers, pie-plant, cauliflower, pumpkins, leeks, parsnips, turnips, peas, okra, corn, beans, and cabbage.

15. Good, ripe fruit, especially eaten at breakfast-time, and never in too large a quantity, is valuable. Dried fruit, raisins, figs, etc., can not be eaten frequently with safety unless they are thoroughly chewed and eaten with bread. Nuts should be sparingly eaten, especially the rich ones, such as butter-nuts, Brazil-nuts, and walnuts. Doctors see a good many children who are suffering from stomach-ache, due to green apples or other unripe fruit, and from sickness caused by eating too many nuts. These children don't like the medicine that has to be given, but they will eat things that don't agree with them. They might have health and comfort if they would only learn to be T-E-M-P-E-R-A-T-E.

16. Now, what are *condiments*? Salt, pepper, mustard, vinegar, sauces, and such things. Salt is an important seasoning for food, and some of you know that if it is not put into the water in which potatoes are boiled the potatoes have a very flat taste, and if it is left out of bread the bread is not good. Salt should be used with most of the food we eat, but the same is not true of pepper, mustard, etc. Pepper you can use sparingly on eggs and meat and some vegetables, and vinegar with a few, though lemon-juice is better for you than the poor vinegar that is sometimes used. The child or grown person who can't eat meat without mustard or horse-radish is to be pitied. The best of all condiments is a good, healthy

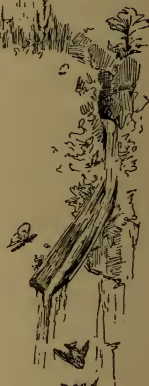
appetite, and the boys who work in the open air as farmers' boys do generally have good appetites.

17. But this is the very thing that people don't have who live on too much or too rich food, or who drink strong drinks, or who stay in-doors most of their lives. The glutton, the drunkard, and the slug-gard often eat mustard and catsups in large quantity in order to get things to taste good to them, thus damaging the stomach. It is better for us and our stomachs to flavor food with leek, sage, thyme, summer-savory, sweet marjoram, mint, parsley, fennel, and other sweet and savory herbs which can be raised in a little kitchen-garden by any of you. In these little gardens you not only can see how the plants grow, but you can help to raise food, or what will make you relish plain vegetable and animal food. The strong seasonings, mustard, catsups, etc., help to create unhealthy appetites for strong drinks and for the use of tobacco.

18. *Drinks*.—There is no drink like good water. When we are thirsty it satisfies us even better than milk, certainly better than lemonade, ginger-ale, and lemon-pop, or ale, beer, or strong drinks, or, indeed, any other liquid that can be found. I suppose the reason that it does relieve thirst so promptly is because water is a part of every portion of the body, bones, skin, muscles, blood, and all. Just as soon as it is swallowed it is ready to go into the blood, through the stomach and small intestine; in fact, it *hurries* into the blood and so goes to every part of

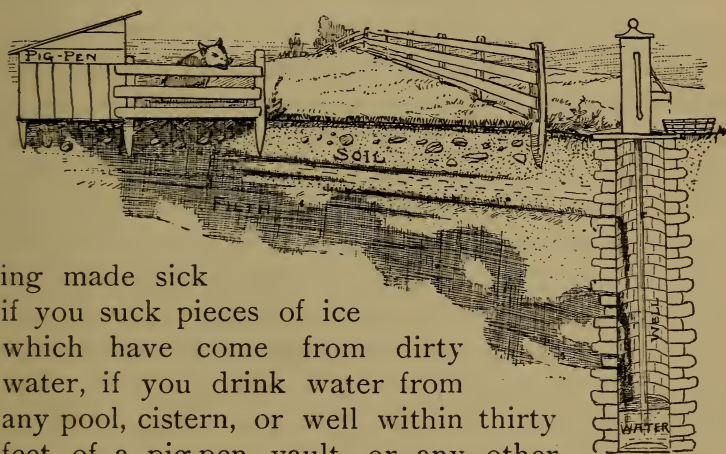
the body, for when we are thirsty every part of the body is thirsty and needs the water.

19. Good as milk is, both for drink and food, it must have considerable time for digestion, and as to lemonade and such drinks they can not take the place of water, and they often do harm by being taken ice-cold, and too frequently, or in too large quantity. When a soldier is tired from marching, and dirty from the clouds of dust which arise when an army is



moving, or when he is weak and faint after a hard fight, how delightful the water tastes which a friend gives to him from his canteen! How the old and the young hasten to drink from the fountains in our cities arranged for the use of thirsty men and beasts! On a hot day how pleasant it is to see the cool water that bubbles up and out of the spring by the road-side or in the meadow!

20. But there is such a thing as impure or bad drinking-water. You always run a great risk of be-



ing made sick
if you suck pieces of ice
which have come from dirty
water, if you drink water from
any pool, cistern, or well within thirty
feet of a pig-pen, vault, or any other
foul spot, especially if the foul place be on higher
ground, if you drink water cooled with ice kept in a
box which is connected with a sewer, or if you drink
water from any stream which has dead animals or
plants in it, or into which flows refuse from factories,
stables, and the like. Whenever you have reason

to fear that your drinking-water may be impure, filter it, *if it is impossible to obtain better drinking-water*. And what is a filter? Something to strain dirty and impure water through to make it fit for drinking. But a filter may do harm if it is not thoroughly cleaned *after each time it is used*, for the dirt and impurities retained in the charcoal, wire, cloth, or other substance of which the filter is made, become more and more poisonous the longer they remain there, and the more frequently the filter is used. A cheap filter can be made of a flower-pot, with some pebbles in the bottom, over this some *clean* white sand, and over this powdered charcoal, but the charcoal should be frequently changed.

21. Now that I have told you about water and milk, there are very few other drinks which children should use. The only things you should drink, unless your own doctor says otherwise, are water, milk, and cocoa. Tea and coffee you are better without, and all liquors like whisky and beer you should avoid. They destroy the appetite for wholesome food, ruin the health, and make a gentle person cross and dangerous, a clean person dirty, and a loving person neglect his family and friends. They are called strong drinks, and so strong are they that if you get into the habit of using them they will surely make very weak and miserable persons of you, besides making your friends grieve for you because you have become slaves. *Water and milk never do any of these things.*

22. Before leaving the subject of food let me ask you some questions in arithmetic, which it will be well for you to solve and to remember all your lives :

“ If a family spends fifteen cents a day for beer, how much is expended in four weeks? How many loaves of bread could be bought for the same money?”

“ If a man spends twenty cents a day for whisky and twenty-five cents for cigars, how much will both cost him in twelve years? How many acres of land, at forty dollars per acre, could he have purchased with the money?”

“ At forty cents a gallon, what is a family’s beer bill for sixty days, taking two quarts daily? How many pairs of shoes, at two dollars a pair, will this money purchase?”

A man, seventy years of age, was sent to the poor-house because he was a drunkard and a vagrant. If he had saved the money he spent for liquor since he was twenty-one years of age—that is, an average per year of fifty dollars—how much would he have had to live comfortably upon when an old man?

For Recitation.

1. What classes or kinds of food are there? Animal, vegetable, condiments, and drinks.

2. What is the most important animal food for children? Milk.

3. What should you particularly remember as to meat? That children need less of it than grown people do, and that it should be chewed very thoroughly.

4. Why is fat in food necessary? Because it helps very much to keep up the warmth of the body, and assists other kinds of food to readily turn into blood.

5. What foods should be used more than they are? Soups and broths.

6. Why is it well to occasionally eat other bread than white bread? Because we are not likely then to tire of bread. Some bread should be eaten at each meal.

7. Is it wise to learn to eat vegetables, especially the green vegetables? Yes, for vegetables furnish certain juices and salts which the blood needs.

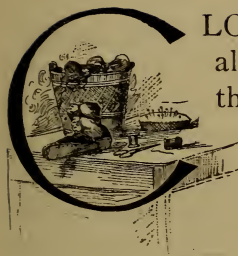
8. What should all of us remember when eating the food we like? To be *temperate* in its use, and not to become slaves to our appetites.

9. Why is water the best drink that there is? Because it quenches thirst best, and very rapidly goes from the stomach into the blood. Besides this, every part of the body needs water.

10. What should you not drink? Drinks that contain alcohol.

LESSON VIII.

Wear and Repair.



CLOTHES will not last forever. You all know that, after you have worn them a long time, there will probably be holes in them, or they will become threadbare, so that they must be mended or patched—that is, repaired. If you handle your dolls much, the color comes off the cheeks, and the hair may fall off, for often it is only glued on. To put color again on the cheeks and hair on the head is to mend, or repair. Every part of our bodies, as we have seen, is constantly wearing out by use, and is all the time in process of repair by the wonderful blood, so long as the machinery is working, and that is, so long as we are alive.

2. You already know, too, that to have the right kind of blood to do this, you must eat the right food, at the right time, and in the right way. Thin, watery blood made from poor food does not furnish enough good material to make strong flesh and bones, beautiful skin, and hair. Food that is too rich makes the

blood too rich, and such blood helps to roughen the skin and to make muscles softer than they should be. The right kind of blood, besides giving strength, carries heat, and helps to give warmth and motion to every part of the body ; and, the more and the faster it goes into a part, the warmer the part grows.

3. This is the reason why, when our ears are very cold, in danger perhaps of being bitten by Jack Frost, or our feet are damp and cold, we rub them hard to make the blood come into them. In cold weather you have seen car-drivers, coachmen, sailors, and others, beat their chests or their hands, to keep them warm ; and you have seen babies cry so hard that their faces would become very red and their skin very hot, so hot that the sweat, or perspiration, would pour out. It is the motion, or exercise of the parts, that makes the blood go into them faster than before, and it is the blood that makes the parts warm.

4. You think this is a wonderful sort of thing—we call it fluid—that goes into every part of the body, and can be sent in larger quantity than it generally goes by means of motion, or exercise. Yes, it is. You can not prick deeply any part of the body except the teeth, hair, and nails, without letting out a drop or more of blood. Each drop has floating in it about three thousand (3,000) little rounded bodies called blood-cells. Most of these blood-cells are red, and may be called little boats, which carry the food and pure air, I have told you about, to the various parts of the body. There are so many of these little

boat-like cells that when even a little blood falls on a light-colored article, such as a handkerchief, it stains a large spot red. If you remember this, you will not be easily frightened when you see such a stain.

5. The blood does not lie loosely in the skin, and under it, in the fat, muscles, bones, etc., but goes to every part of the body in soft but strong vessels, pipes, or tubes. When you prick any part and let out the blood, you make a hole into a very small blood-vessel, so small that you could not see it without a very powerful magnifying glass. These very small blood-vessels are called *capillaries*, or hair-like tubes, and are arranged in the various parts, in different ways. Here is a picture which shows, largely magnified, some of the capillaries in the eye, with a few of the larger blood-vessels.



6. The vessels that are under the skin, between the muscles and bones, and deep down in the body, are much larger, and their walls are much thicker, so that they don't easily burst, as the blood is pumped into them when in health, as water sometimes bursts rubber hose

when the fire-engine pumps the water into it very fast. But there is a time when they may burst, and that is when they have become softened by over-use of the brain, or by our living on too rich food, and especially if with such food alcoholic drinks are used. If a blood-vessel bursts in the brain, the person may become unconscious (i. e., doesn't know anything that is going on about him), or he may die. This bursting of a blood-vessel in the brain is called *apoplexy*.

7. There are two kinds of large blood-vessels, the *arteries* and the *veins*. Arteries carry the red or pure blood from the pump or heart *to* all parts of the body, and there connect with one end of the capillaries. The veins connect with the other end of the capillaries, like one tunnel with another, and convey the blue or impure blood *from* the parts to the heart. Because the blood starts from the heart, goes to all parts of the body, and then comes back to the heart, these movements are spoken of as the *circulation*. The vessels that carry the blood *through* the parts are the capillaries.

8. The blood moving in these vessels carries nourishment to the parts at the same time it receives into itself, through the walls of the capillaries, very small pieces of worn-out material from the parts through which it flows. This refuse is carried by the blood-current into the veins, and by them to doors or openings in the skin, kidneys, and other organs, and there are thrown out of the body. Here is a picture which shows the arteries in red and the veins in blue. You



see how near these two kinds of blood-vessels are to one another, and you notice how the arteries begin at the heart as large tubes, and grow smaller and smaller as they approach the capillaries. Veins are the blue lines, which you see on the back of your hand, or on the temples of any one who has a thin skin. They begin as small tubes at the capillaries, and become larger and larger as they approach the heart. In the picture are only a few capillaries; it is impossible to show many of them in such a small picture.

9. Sometimes the blood carries so much food to a part that it can not use it all. Nature provides for this condition of things, and has put into our bodies hundreds of little vessels, which empty finally into large veins, but are not blood-vessels. These are called *lymphatics* (carriers of lymph), and convey to the heart and then to the lungs, where it is purified, the excess of food referred to. There are so many lymphatics, and their walls are so thin, that sometimes poisons are readily taken in by them from the skin, mouth, and other parts, and carried into the blood, and so poison the body.

10. The *heart* we have left till the last, though it is the most important part of the machinery. Its duty is to send around the body the five or six quarts of blood that is in the body at any one time. It is the powerful pump that starts the blood on its rounds. If it stops moving or beating, as we call it, the blood stops flowing, we stop breathing and die, just as in the watch, if the wheels stop moving, the hands stop,

and the watch dies, until it is wound up again. If the heart stops moving for more than a few minutes, no doctor can set it going again.

11. Most of you know that your heart is in the left side of the chest. You know it because, when you have run fast up-stairs, or in a game out-of-doors, you breathe fast, and something thumps away in the chest at the ribs, as if it must get out. That is your heart. I say *most* of you know where your heart is, because I have met with people who did not know.

12. If you put your ear against the chest of a healthy baby, or your dog or cat, you will hear the heart beat with the same time between the beats, like the ticking of a clock. It is not so with the person who smokes a good deal, or is a drunkard, or is ill, or who lives on too rich food, and does not work hard enough. The heart of such a person does not work regularly and beautifully. It is disturbed and anxious; and if the heart is out of order, the whole body is out of order, for all parts of the body are then not supplied with food as frequently and regularly as they should be by the little red blood life-boats.

13. When we listen to a baby's heart, and then to a grown person's, we find that the baby's heart beats much faster than the other, and if we feel the pulse, as the doctor does, that is, put a finger lightly on an artery as it passes along the front of the wrist, or in the upper lip, or on the side of the head in the temple, we will find that the beat here shows the same thing. The heart, as it beats or throbs, sends out the

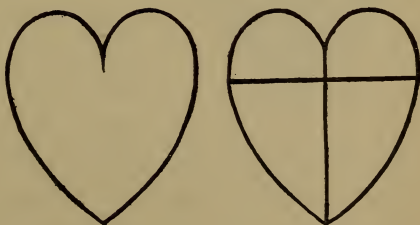
blood from it into the arteries in jet after jet, and, as the blood moves along in the arteries, it moves in waves. These waves form the pulse. When the blood reaches the capillaries, it gently oozes out of their walls to bathe the parts in the good food for which they are hungry.

14. The heart-beats are caused by the walls of the heart squeezing the blood from two rooms in it into two other rooms, and from these two rooms into the arteries and into the lungs. The heart works night and day, catching a little rest here and there between the beats, which are over one million in each twenty-four hours. Just think of the work it does! What a faithful servant and friend it is, ever working for us in sickness and in health, by night and by day, when we are sad and when we are happy, and lasting us many years, if we don't work or play too hard, if we don't worry too much, if we don't tire the heart out by making it go too fast through drinking alcoholic liquors, or make it unsteady by tobacco smoking! It is said that a railway-engine, strong as it is, seldom lasts more than twelve years.

15. What is the heart like inside?

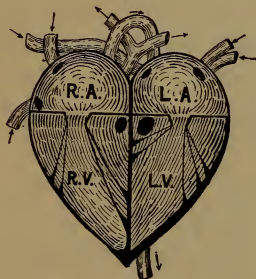
Let us see. Sup-

pose you take a make-believe heart, or a valentine heart—that is, such a heart as some of you draw



on your home-made valentines. Cut it down through the middle. Now, divide it into four rooms, thus. The two rooms on the left side of the upright line are on the right side of the real heart—that is, toward the right side of the body; and the two rooms on the right side of the upright line are in the left side of the real heart—that is, toward the left side of the body. But these rooms have openings in them for the blood to come in and to go out. The two upper rooms are smaller than the lower, and are called *auricles*, because they were supposed, when named, to be shaped like little ears; the two lower are called *ventricles*, because they were supposed to be shaped like stomachs.

16. Into the right auricle (R. A.), through two openings, the blue, impure blood flows from all parts of the body. When the room is

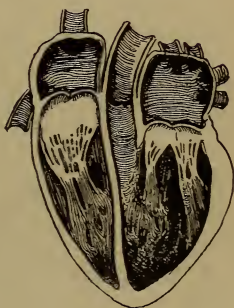


about full, the muscle-walls close toward one another, and squeeze the blood through some little doors (called *valves*), which are at the same time pulled open from below by muscles, and the blood goes into the right ventricle (R. V.). When this is about full, its walls squeeze out the

blood through one large opening into blood-vessels which carry it into the lungs, where it becomes red and pure, and returns to the heart and goes into the left auricle (L. A.). From that room it is squeezed as before, but now through little doors into the *left ven-*

tricle (L. V.), and from here squeezed out into the largest artery in the body, then into smaller ones, and so is sent to the capillaries.

17. Thus the heart moves, that is beats, and so the blood is sent out from the left ventricle to the capillaries, and returns through them to the veins and through the veins to the right auricle again. Here is a picture of the inside of a real heart. See if you can find out where the vessels, rooms, openings, and valves are. Better still if you will get the heart of a sheep or calf at the butcher-shop, and open it and see these things for yourself.



18. You know now that the blood carries warmth and food to all parts of the body, and because it does these things it is often called the life-blood. But, in order to do these things well, and to carry off waste material to be thrown out of the body by the lungs, skin, kidneys, and bowels, other helps are necessary besides a strong heart and blood-vessels, and good food and air, and these things are exercise, warmth, cleanliness, and a good overseer, who has his headquarters in the brain. All these things we will tell you about farther on.

For Recitation.

1. What is there in our bodies which keeps all the parts supplied with nourishment? The blood.
2. What is blood? A red fluid which is made in the body from the food we eat.
3. What does it do? It passes rapidly through the body to every part, carrying warmth and nourishment.
4. How is it carried from one part of the body to the other? By blood-vessels.
5. What are these blood-vessels called? Arteries, veins, and capillaries.
6. How does it get into the blood-vessels? From the heart.
7. What is the heart? A sort of bag made of muscles whose duty it is to send blood through the body.
8. What is the pulse? It is the movement of the arteries as the waves of blood go through them.
9. Does it make any difference whether the blood in the body is good or bad? Yes; a very great difference. Good blood brings new material to every part of the body to take the place of that which is used up. Bad blood can not repair any part of the body as it should be repaired.
10. What will make good blood? Good food, a right use of our muscles, proper care of our skins, and the use of other means necessary for health.

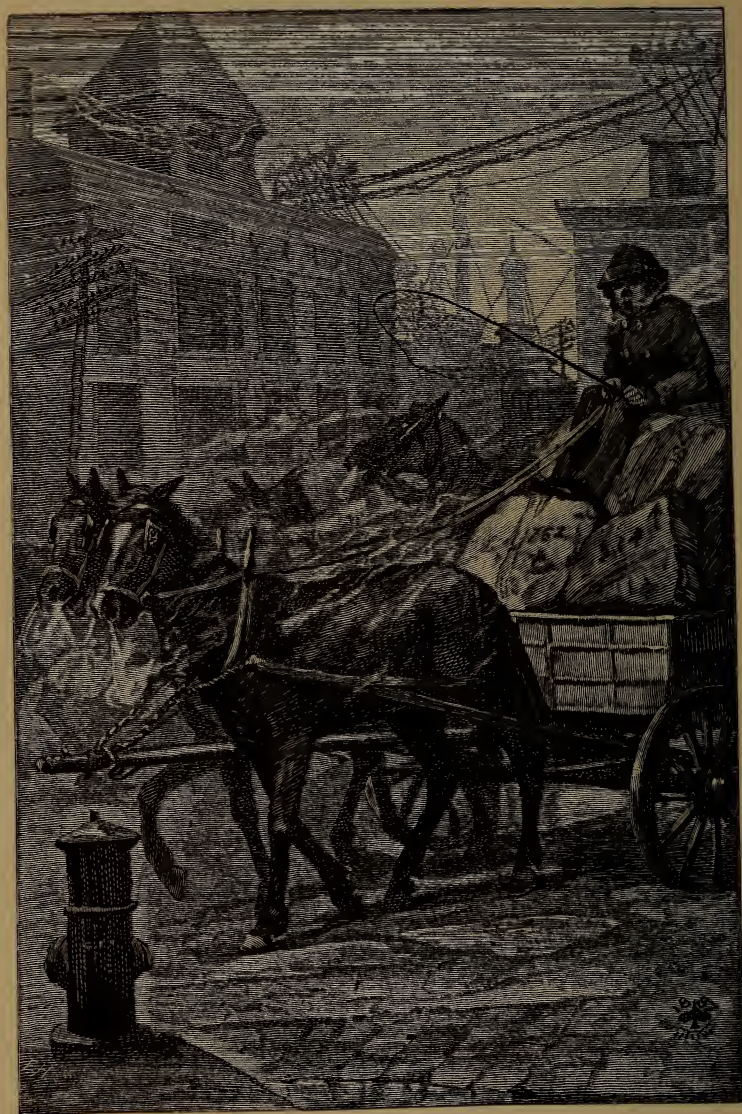
LESSON IX.

Warmth and Clothing.



VERY part of the body in health is moving in some way or other, without our perceiving it, and warmth is necessary for all this motion. The boy who owns a printing-press knows that if the press is to work well and to move easily, the room in which it is must be warm enough to keep soft the oil used in various parts of the machine. The man who owns a trotting-horse knows, if the horse has not been driven for a few days, that, when he is taken out for a drive, he must move about for a while before he gets "warmed up" to do easy, thorough, and graceful trotting.

2. We know that our bodies are warm inside, because if a thermometer, such as is used by doctors and nurses, is put into the mouth, the little column of mercury will rise in the tube until it points to about $98\frac{1}{2}^{\circ}$ Fahr., showing that the body is a *very* warm sort of stove. If a thermometer outside in the open air, by the drug-store, or wherever you may look at it, points



to 80° , you would say it is *hot*, and so it is; and if it should go up to 90° or more, you would say, "Whew! it's dreadfully hot!" So the body inside might rather be called hot than just warm, but pleasantly warm outside on the skin, just as a stove very hot on the inside may give gentle warmth to a room. Sometimes in a fever the body gets very hot and the mercury in the thermometer will point to over 100° .

3. We know that what comes out of the body is warm, as the breath and perspiration; and if we cut ourselves so as to bleed, the blood is warm. On a cold day, when the air outside the body is colder than the air inside, the moist air in the breath we send out condenses by the cold, and we seem to be pouring out steam as a tea-kettle does, when the water in it is boiling. You notice this steaming most when animals are carrying heavy loads in cold weather, for then the steam comes from all over the body. So it does probably with us, but our clothes hide it from our sight. We know that our skins are warm, for when we take off our under-clothes at night they are warm, even if we have been out in the cold.

4. Now, it is well known that if anything cold touches anything warm, some of the warmth goes out of the warm thing into the cold one. If you touch a cold stone, some of the warmth goes out of you to the stone; that becomes warmer and your hand colder, and we say the stone is cold. If a cold wind blows over us, it takes some of the heat from the skin, and drives some of it deep into the body. If it takes

away too much or drives too much in, we are likely to have a sore throat, or be sick in some other way. So you see how important it is to keep our bodies warm enough; and this we are to do principally by proper food, clothing, bathing, and exercise.

5. If I should ask some of you, who had not studied about health, what clothing is worn for, you would say, "To make us look pretty," and it is a good thing to look pretty, but it is better to be comfortable. If you can be both comfortable and pretty, that is best of all. So with clothing, *comfort* or *use* is the first consideration, and beauty the second. The use is to keep our bodies warm by keeping the natural warmth in, as well as by giving us additional warmth, and to protect our bodies from dirt, and disagreeable or hurtful things which may harm us. As far as possible the clothes meant for comfort should be those near the skin and those which are worn most. Those for beauty, mainly for other people to look at, should be on the outside.

6. The artist has drawn these three children. You can see such almost anywhere. It is cold weather, and one of the children has on clothing which is warm and at the same time good looking. He is comfortable, looks well, even pretty, and can play around as lively and happy as anybody. The second has on too much clothing, and is neither comfortable, good-looking, nor happy; and neither is the third, a girl, whose mamma thinks it makes the child lovely to have a thin dress and bare legs. Her outside wrap, pretty

as it is, does not keep her limbs and the lower part of her body warm, though warmth is there much needed.



7. To keep in the warmth and to give additional warmth, it makes quite a difference *what kind of clothes we wear, and how they are worn*. If you put a piece of linen or cotton cloth around a tin can of coffee or soup, the covering gets warm very fast, but the air outside takes the heat out of it very fast also, and soon the can, and what is inside of it, grow cold. But, if you wrap it in woolen cloth, the heat is not carried through it so quickly, but remains in the can, and it will be a long time before the coffee or the soup cools. So with ourselves. Linen and cotton cloth make cool clothing if worn next the skin, while woolen is warm cloth, partly because it keeps the

natural warmth in the body, and partly because being warm itself and having warm air mixed up in it between the fibers, it brings warmth against the body and keeps it there.

8. If we live in very hot countries, woolen clothing is not necessary. In the tropics it is so hot that people must get along with but very little clothing, sometimes none at all. White, gray, or light-colored clothing is the coolest and best for hot weather. In cold countries wool and fur clothing should be worn, and little or no cotton or linen. In temperate climates, where the weather changes very frequently from hot to cold, or from dry to wet, it is wise to wear woolen cloth next the skin the whole year round. Very thin cloth in summer, and thicker in winter. When a mother asked a celebrated doctor what her baby needed, he replied, "Plenty of milk, plenty of exercise, and plenty of flannel." The last two we all need whether we are babies or not.

9. How should clothes be worn? Certainly not tight-fitting. Let me explain why. Tight clothing is not only uncomfortable, but it puts different parts of the body out of shape, prevents their free motion, and hence disposes to disease. Under it there is but little air, which, in larger amount, would be like a soft warm pad against the skin. Now you see why a pair of gloves is colder than a pair of mittens, and why two pairs of cotton socks with cushions of warm air between and under them, may be warmer than a pair of woolen socks, and why a good blanket, though

light, is as warm, or even warmer, than the so-called comfortable, which on account of its weight is very uncomfortable. While we are talking of bedclothes, let me remind you that newspapers sewed between cloth make good bedclothes, as well as lining for vests and sacques.

10. Tight collars not only cut off some of the air which ought to go to the lungs, but are so uncomfortable that you see boys and girls who wear them keep putting their fingers between the neck and the collar, or they stretch the neck upward, in the hope of getting ease. The clothing about the neck should be loose, to let the impurities which come from the skin escape easily, as well as to allow us to breathe readily, even when walking fast or running. Not only should the neck be loosely covered, but it should be open to the air except in very cold weather.

11. You have seen sailors in their loose blue shirts, and have noticed how the shirts are cut away at the neck. Underneath is an undershirt or vest, which comes up to the neck, but the neck itself is free and clear. All this is done to obey a rule of the navy, and a wise rule it is. If you wear tippets or fur collars, except in the very coldest weather, you will be likely to make your necks too warm, so that when you take off the wraps the cool air will suddenly carry off or drive in the heat, and you will, as people say, catch a sore throat or something worse. It is an enemy catching you rather than you catching the enemy.

12. The fact is, you want just enough clothing, and no more, and if you are stirring about you need less than when you are sitting still, for in motion more body warmth, called animal heat, comes to the skin. If you are sitting still, you need plenty of warm clothing, for you are not moving your muscles and sending extra warmth to the skin. People who don't remember this are likely, if sitting poorly clad, or for a long time in a cold room, to "catch cold" in the lungs and have pneumonia, or in the nerves and have neuralgia, or in the muscles and have rheumatism.

13. When you are out-of-doors you should stir about, then you will not need to be bundled up, but will keep warm and comfortable. A little cold air when you are stirring about out-of-doors is a better tonic for you than most medicines, and the child who thinks he can not stir out-of-doors except when the day is very warm loses a great deal of pleasure. Too much heat out-of-doors or in-doors makes one feel weak, and if the air is very hot there is danger of the brain being affected from "sun-stroke" or "heat-stroke."

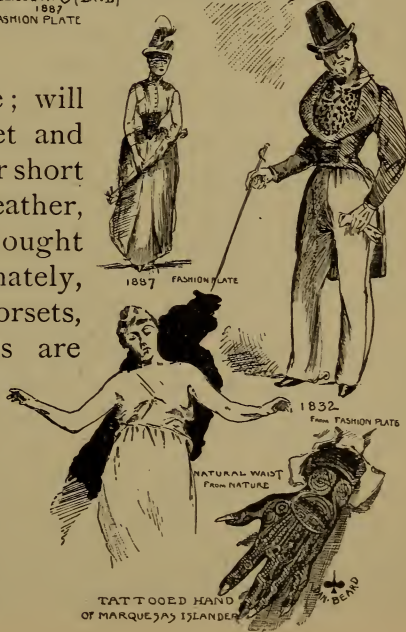
14. When we read in stories, told by travelers, of people who cut themselves, tattoo their skin, stain their teeth, put rings through their noses and lips, pinch their feet, or flatten the heads of their little children out of shape, simply because it is the fashion of their country, we pity their ignorance. Yet fashion will make us press out of shape the chest and

the organs inside, the heart and lungs, whose motion



is so necessary for life ; will make us pinch the feet and compel children to wear short stockings in cold weather, simply because it is thought to be pretty. Fortunately, at the present time, corsets, supporters, and bands are not worn so much by children as they were formerly, when even boys wore stays.

15. In certain families there is still a tendency to have chil-



dren imitate grown-up people in their dress as well as in their ways of speaking and acting. These children become little old people, funny perhaps to look at, but sad to think of, for they generally are not strong, nor are likely to live a great while, unless they become children again, and really play out-of-doors with other children, instead of walking about as if they were sixty years old. But, of course, a child can't hop, skip, and jump, or trundle a hoop, or play leap-frog, if the sleeves are so tight that the arms can't swing easily about, or the clothes so tight about the chest that one has to breathe very fast to get air enough to make his blood pure and to allow the impurities to come out of the cramped lungs. If the chest has a chance to move out and in, all these things can be done with easy, quiet breathing.

16. If the feet are cramped by tight shoes, especially with high heels and narrow toes, it becomes painful to play or even walk! Think of the injury done to the delicate foot, which has in it many bones, muscles, and tender blood-vessels! Think how the blood must be squeezed out of it, and how badly the foot feels when the blood is cut off! With moccasins the Indian can move his feet freely, standing with ease on tip-toe, if need be, and the feet grow strong and supple.

17. When sandals were worn, the feet were beautiful to look at. Nowadays it is very uncommon to see feet that are not out of shape, so badly have shoes fitted the feet. I say have fitted, because many peo-

ple are now wearing common-sense shoes, and the shoemaker is in many places no longer a mere cobbler.

18. A healthy baby's toes branch out somewhat from the foot. As the child grows older, the toes



come nearer together. The adult's foot should be a beautiful one, with regular toes and supple joints, but how few of these we see, and how many with toes bent in by the pressure of shoes, or even crossing each other, or with clumsy ankles and the soles perfectly flat, instead of being arched !

19. I suppose I need not tell you that clothing, especially that near the skin, should be *dry* and *clean*. This is true of bedclothing, as well as of our personal clothing. If we are caught in a storm, or get wet in a pond, we should hurry as soon as we can to shelter, take off the wet clothing and dry our skins thoroughly. No one is so strong that he can afford to be careless.

20. In some of the schools I have visited I have been told by the principals that there were boys present who wore the same clothes night and day for weeks together—just think of it! In other schools I have seen neat, tidy-looking girls, who were not ashamed to wear aprons, and even extra sleeves pulled over the sleeves of their dresses, to protect the clothes, for you know how quickly rubbing the elbows on the desks wears out the sleeves.

21. Certainly we should change our clothes at night, to enjoy a peaceful sleep, and to have the feeling of cleanliness about us. At night our day-clothes should be placed where they will be well aired, and our night-clothes in the morning should be hung up, not put under the pillow. The beds, before being made up, should be exposed for some time to sun and air.

22. When we are warm, we don't need so much food as when we are chilly, so it has been said that clothes take the place of food, though some of you would not care, I take it, always to receive clothes when you ask for food. But it is a good thing for you to remember that if persons have not enough clothing or food, especially in cold and windy weather, when the body loses heat very rapidly, they are badly off, and this condition of things may come to any of us.

23. So, instead of throwing away old clothes, or selling them to the ragman, form among your school-mates Harry Wadsworth clubs or "lend-a-hand" so-

cieties, mend the old clothes and give them to children who need them. There is nothing disgraceful in wearing neatly-patched clothes, but there is in going about ragged and dirty. You can also support coffee-houses and diet-kitchens, where good, warm, substantial food can be sold at very moderate prices, and so help to keep people healthy and warm, and out of the liquor-saloons.

24. In one of our cities, among the large warehouses, there is a warm, cozy dining-room called "The Crumb," where the workmen who work along-shore can procure cheap and wholesome meals, and so do not feel that they must go to a saloon and buy a glass of beer or liquor for the sake of getting some of the "free lunch" which is given in these places to induce people to drink.

For Recitation.

1. Is it necessary to keep one's body warm *inside*? Yes; for without warmth the parts inside can not move readily.

2. Is it necessary to keep one's body warm *outside*? Yes; for if we become chilled or cold on the outside, some of the blood in the body is driven in too large a quantity into the lungs or some other internal part, and we are likely to be ill.

3. What is useful to help keep warmth inside and on the outside of the body? Clothing.

4. In selecting clothing, should we consider first our comfort or our looks? Our comfort.

5. When is our clothing comfortable? First, when it is neither too tight nor too loose. Second, when there is just enough, neither too much nor too little. Third, when it is dry and clean and light.

LESSON X.

Cleanliness.



ET every child who reads this book learn "to hate dirt and to get rid of it, not to hide it." If your skin is not clean, no matter how much beautiful clothing or fine jewelry you wear, you are still a dirty child. If, after sweeping a room, you put the dust in a corner, out of sight, or leave some on the top of a picture-frame, because nobody will notice it there, you have simply changed the dirt from one part of the room to another, for dust is dirt, and you haven't got rid of it. "But," says some one, "I thought dirt was not always a bad thing. I know of doctors who tell little children to 'live out-of-doors and to play in the dirt.'" Yes, that is true, but there's a difference between *clean dirt* and *dirty dirt*, and whether you *stay* dirty or not. You may make mud-pies, and even get dirt on your hands and face, without harm, if you don't leave it there. You all like to dig down to water in the clean sand by the sea-shore, and it is good for you.

2. Clean dirt is dirt which hasn't had foul water upon it or in it, and which is not mixed with rubbish

or, what is worse, dead plants, insects, and other such things. Dirt, which is removed from the body by bathing, is dust from the air about us, mixed with the impurities which have come out of the body by the skin, together with pieces of dead skin, hairs, fibers of cloth; and the sweat or perspiration, which if left very long on the skin, becomes sour and dirty, and is then really dirty water. The dirt in our houses comes from fires, carpets, clothing, curtains, skins, food, etc. The dust out-of-doors contains sand, seeds, and pieces of wood, leaves, insects, coal, hair, leather, food, and ever so many other things, but, worst of all, little living but invisible bodies called *bacteria*, which seem to hunt out the weak and sickly and dirty, and give them scarlet fever, measles, small-pox, or some other so-called contagious disease.

3. These little bodies, or *germs of disease*, as they are called, are like so many hidden enemies out of our sight, but ever ready to pounce down on us if we are in condition to receive them, and that we are when we are careless about our food, air, clothing, bathing, and exercise. Dust will travel long distances, as it is blown by the winds, and will force its way into houses, schools, and churches. So you see you can hardly help getting dirty, and it is not wrong if you do, but it is wrong to *keep dirty*. There are some children, I am afraid, who look upon soap, water, a sponge, a wash-rag, and a towel as enemies, for it is really some trouble to keep ourselves clean; but remember the hidden enemies I have told you of, the little bacteria,

how they are real enemies whose *business* it is to make you sick if you will only let them. "If one of these enemies was magnified to make it an inch long, it would be just as if a man of ordinary size was made eleven miles high."

4. I have met with children who thought it unnecessary to wash all over, but that was because they didn't really know how wonderful a thing the skin is, and how important it is to keep it all clean. There are a good many children who don't wash their necks and behind their ears, the places, they think, people can't see; but they do see, just as they do when you don't black the back part of your shoes. Such chil-



Tidy.

Untidy.

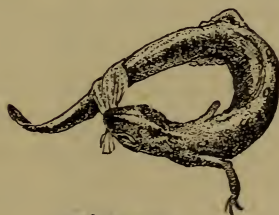
dren are not likely to clean their finger-nails, or to keep their clothes neat or their books clean.

5. Before you can really know why you should

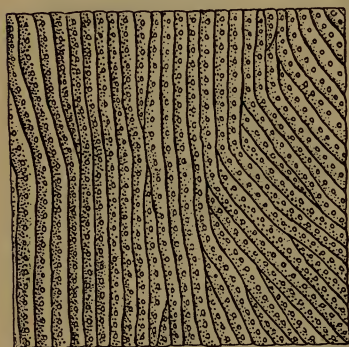
be clean all over, you must know what your skin is and why it needs care. Ants and cats and even rats keep themselves clean, from what we call instinct, but children want a reason for the things they are told to do. One reason why the skin should be kept clean is that waste particles go out of the body by little canals in the skin, and through thousands of openings called *pores*. Through

these pores water, and sometimes, as in illness, medicine and food can be taken in.

6. On the outside of the skin are several layers of scales — not large, like the scales of a fish, but little ones.



Some of these you can easily scrape off. They rub off into the water whenever you wash your hands, and frequently fall off and float away in the air to carry with them scarlet fever or other contagious disease, if you happen to have one. The lizard and frog leave off their whole skin at once, instead of scaling off as we do. The gentleman who saw this lizard stripping off his skin says that it took but five minutes to do it. The scales have no blood nor feeling in them, and are meant to protect the tender skin beneath, which does bleed and hurt when it is pricked or cut. Upon the body they form the *outer* skin, or *false skin*, or *cuticle*. When you burn yourself so that a blister comes, the covering of the blister is the cuticle, and the water is from the injured capillaries. If you break this cuticle, you know how sore the true or under-skin is when exposed to the air.



Ridges and Pores of the Skin.

7. Out of some of the pores comes the *perspiration* or *sweat*. It flows out on the skin all the time, but we don't notice it unless there is consid-

erable of it, and then we say, "We are in a perspiration." Just so the tears flow all the time, but we don't know anything about them until they overflow from the eyes upon the face. To let the perspiration

freely out is another reason why the skin should be clean and the pores open, for not only does it carry dirt with it, but by evaporating it cools the skin when overheated. Perspiration comes from long tubes which have their lower ends coiled up in the true skin and near the fat which lies beneath. These coils are surrounded by capillary blood-vessels, some of which nourish the parts, and some send into the coils or *sweat-glands*, as they are called, refuse material and water, so that these glands are like springs in which water is always bubbling up from deep streams underground.

8. Now you see how the skin can be cooled if the pores are open, and the true skin and delicate blood-vessels are protected by the false skin. You will want to know why a baby don't get wet through when it is taking a bath, as a doll would be very likely to do if dipped in water. One reason is, because water is coming out of the pores; another, that water does not readily go through the scales on the skin; but, more than this, there are many pores that send out oil upon the skin to keep it smooth.

9. There are so many of these *oil-glands* or bags that open on the necks and faces of human beings, especially on the sides of the nose, that boys often shine hard rubber rings by rubbing them on the skin of these parts. Very many oil-glands open close to the roots of the hair, and if we brush the hair frequently it will be beautifully smooth from this natural hair-oil, and it will be seldom necessary to use

any other kind of grease. Look at the careful groom, how he rubs and brushes, and brushes and rubs, the coat of the horse until it feels like velvet! A well-brushed horse is never frouzy, and neither does a boy or girl need to be so.

10. The skin, besides being a covering and protection to the parts beneath, besides sending out impurities and helping to regulate the heat of the body, is also the principal part of the body that we feel with. The last use of the skin which we mention is to take into the body some of the pure oxygen in the air, and send out some carbonic-acid gas—that is, it breathes. The skin then does *six* kinds of work, more than any other part of the body that I know of, and if it is not clean it can not do this work well.

11. But, while we are talking about the skin, we must not forget the *hair* and *nails*, which are really a part of the skin. The little, soft, pretty, pink nails of the baby are more for beauty than use, but as the child grows older the nails grow stronger, and protect the ends of fingers and toes from injury, and help the fingers to pick up things. Many people, in parts of the world where feet are as free from covering as the hands, can readily pick up things with the toes. A child who has the habit of biting the finger-nails instead of cutting or paring them, is likely to make the skin under them sore, and the nails rough and jagged, and of little use.

12. Hair not only protects the head from injury, but in eyelashes and eyebrows prevents perspiration

from trickling into the eyes. Now you understand why old men and others who have lost much hair are obliged to use their handkerchiefs freely, and to mop their heads and faces. If you want to have a good thick head of hair, you must not keep it covered with thick or tight caps or bonnets, but expose it freely to the air, brush it thoroughly, and when you take your bath wash your head as well as the rest of the body.

13. So important a part of the body is the skin that, if it is too dirty to work well, impurities are kept in the body, and perspiration and heat can not come out, and the whole body gets sick. When the body is in good condition the skin is clear, and the cheeks actually glow with the red hue of health. It is not necessary to paint them, as dolls' cheeks have to be painted. Nature does the work. One of the sad things in life is to see the roses fade out of the cheeks of a once well and happy boy or girl, because he or she can not or will not live in pure air, take enough exercise, eat proper food, dress aright, and be happy and contented.

14. A child clean in person will probably try to have his clothes mended and clean. As he grows older, the *habit* of cleanliness will be so fixed that his house will be kept clean, dirt and rubbish removed promptly, and garbage will be burned instead of left to stand around to poison the air. If a bird is kept in the house, the cage, perches, wire, bottom, and all will be cleaned, and dirt will be looked upon as an

enemy wherever it intrudes itself. When the neat child is grown, he will do what he can to assist others to put away dirt. The cleanly person will appreciate how light points out dirt, and will arrange to have sunlight in all his rooms. He will *know* that dirt must be got rid of, and the air made pure, and so will have his house well ventilated. If naturally dirty



boys or girls do not try to become neat, they will probably become more and more slovenly and idle, and perfectly content to live in shabby houses, or huddled together with others of their kind in a wretched cellar or attic.

15. I suppose most of you children think you

know all about *how to bathe*, to keep yourselves clean. Let me see if you do. Do you know that neither hot nor very cold baths are safe to take at any time, and especially if people are weak, or have any disease of the heart or blood-vessels? Do you know that a good, pure soap should be used with most of our baths to remove the dirt and greasy particles from the skin; that the skin should be rubbed very dry after each bath; that we should bathe if possible in a warm room; that we should try to get used to cool-water baths; and that we can not all remain safely in the water the same length of time? I have seen grown people and children in the water at Coney Island shivering with cold, but watching the big clock on the pier to see when fifteen or twenty minutes were up, the time they thought they should give to the bath, whereas the truth is that some people can safely stay in only five minutes, and some half an hour or more.

16. Here are four rules to learn: 1. It is well to sponge or wash the entire body two or three times a week in cool water, and once in warm water. 2. Become accustomed to cool water, at first using warm and gradually making it colder. 3. Don't stand shivering in the tub or the ocean, pond, or river, but get out if your skin begins to pucker, making what is called goose-flesh, and your teeth chatter, and your lips grow blue, and you feel chilly, *no matter how short a time you have been in the water*. 4. When you bathe, first wet your head well, then jump

right into the water, and stir around while you are in, and dry yourself thoroughly when you get out. Thorough friction or rubbing of the skin after a bath with a good towel and then with the hands, till the skin glows, is important. Even dry rubbing—that is, when no water has been used—is of service to the skin. Every child should use each day, for the sake of cleanliness, the five brushes which the artist has put in connection with this picture, drawn by a little girl.



For Recitation.

1. Why should we like to be clean? Because dirt on our bodies spoils our looks, and keeps the skin from doing its work.

2. Why is dust spoken of as dirt? Because it has in it dead and sometimes harmful things—insects, hair, pieces of skin, etc., and at times germs or seeds of disease.

3. Why is it necessary to be clean all over? Because the skin covers the entire body, and it is through the skin that part of the refuse comes out of the body.

4. What kinds of work does a healthy skin do? Six kinds. It protects the parts underneath; through it we feel things by touch; it lets refuse matter go out through its pores or openings; it lets out perspiration to cool the body; it takes into the body water and sometimes medicine; and it helps us to breathe.

5. What kind of hair-oil is the best? The natural oil from the oil-glands in the skin.

6. How can you compel the glands or bags to send out the oil, and how make your hair smooth? By brushing the hair frequently with a good brush.

7. What are the nails for? To beautify and protect the ends of fingers and toes, and to allow us readily to pick things up.

8. How does the care of the skin affect our health? If we don't keep the skin clean, we interfere with its work, and make other parts of the body do more work than they should.

9. Why is it a good thing for children to get into the habit of being clean as to their persons? Because the habit will grow stronger as they grow older, and they will be likely to have their houses and grounds clean, as well as themselves and families.

10. What brushes should you use each day? The hair-brush, the tooth-brush, the nail-brush, the clothes-brush, and the shoe-brush.

LESSON XI.

Work and Play.



ALL work and no play makes Jack a dull boy," is a proverb I suppose most children have heard. Some of them don't believe in any kind of work, and do believe in all kinds of play ; yet it is equally true that all play and no work is very bad, indeed, for both boys and girls. It makes them worse than dull, it makes them lazy and selfish, if it does not get them into bad company, and, finally, the poor-house or prison. The fact is, we need both work and play, and in both we must be really interested if we expect any good to come of it ; so—

“ Work while you work,
Play while you play,
That is the way
To be cheerful and gay.”

“ Moments are useless
When trifled away ;
So work while you work,
And play while you play.”

2. All of you know of children who mope about, even when they are at play. They are a hard lot of children to play with. Some of them, I fear, are too lazy; some have eaten so much that to play in a lively way will make them have a stomach-ache; some are so bundled up that they can't move their arms or legs comfortably; some wear clothes so fine or so tightly fitted to their bodies that they are afraid to move lest they may soil the clothes or tear them. There are children (and you must never make fun of them, for that is mean and wrong) who have never learned how to play; either because they have been weak and sickly most of their lives, or because they never have been allowed to play as healthy, active children should—that is, to romp and have a good time.

3. When you really work and really play, you *exercise* your body—that is, you set the muscles to work, the heart pumps the blood through the body more strongly than before, and the lungs work harder. If you exercise as you should, in pure air, all the cells in the body, at the right time and in the right way, separate from the blood what is needed for the nourishment of bones, muscles, skin, and other organs. All parts of the body begin vigorously to work, more heat is made, the skin glows, and the boy or girl who is exercising feels warmer, happier, and stronger.

4. If you don't work and play with energy, the muscles will grow weak and flabby, the bones softer, the heart will not act like a well-oiled pump, the blood



Work.

will move through the body as a slow, sluggish stream of water moves along; little oxygen will be taken into the lungs, but much of the poisonous carbonic acid kept in. The skin will flush or grow cool easily, and the person who does not exercise, feels chilly, miserable, and weak. The ant, the spider, and the bee show what can be accomplished by steady, persevering work.

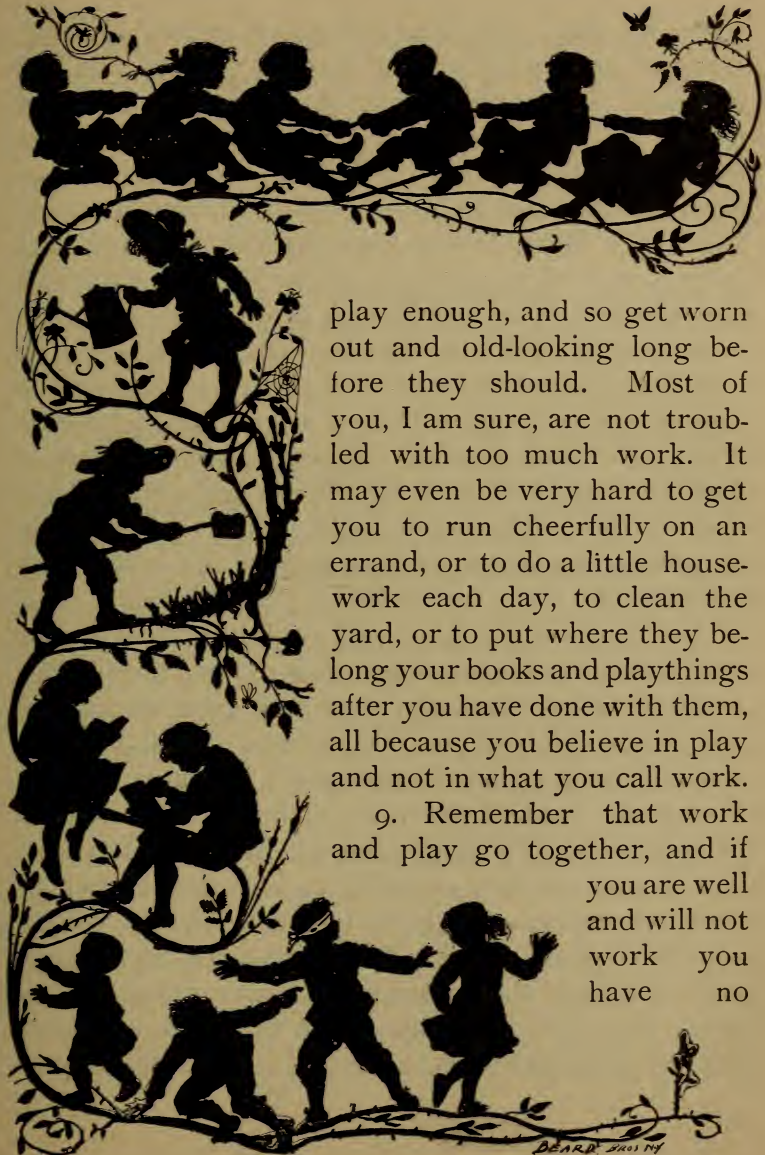
5. Sometimes children play too hard, or are made to work too hard, which is all wrong; for then the muscles, bones, heart, lungs, and all parts of the body become tired out and injured so that they are of little use afterward. It is wrong, for example, for a girl to jump rope until she is so tired she can hardly stand, or for a boy to skate until he aches all over. *Feeble children should never try to do all that strong children do*, even if they are laughed at for being "dared" or "stumped." If you are feeble, think more of how your heart is going to stand it if you play "follow my leader," than of how your feelings will be hurt if you don't.

6. If you change your games frequently, you will not tire of play. There are games so rough, or that boys play so roughly, that I must say a word about them, for I have seen boys hurt very badly in such plays. One is "beat the squirrel," another "beetle and wedge," in which the boy who is pushed so roughly against another may have his neck sprained. In the game of "trades" a boy is likely to be hammered, planed, or rasped so hard that he may be in-

jured. In "mumblety-peg" more than one nose has been injured by being rudely driven into the ground. Throwing stones or ice-balls is a dangerous pastime. It was but the other day that a lad, happening to be passing near where some boys were throwing ice-balls, was hit on the head by one containing a stone, which some boy had put there, thinking it was funny; and, though the surgeons did all they could, the bone which was broken, pressed upon the delicate brain, made it inflame, and the poor little fellow died. *It is not funny nor manly ever to injure any one's property or person*, and there are enough sports that are safe.

7. Some of you who don't know how to work (and there are such children, just as there are children who don't know how to play) are wondering by this time what kind of *work* can we children do. You forget how you sing in one of your plays, "As we go round the mulberry-bush," telling how you wash your clothes on Monday morning, iron them on Tuesday, scrub on Wednesday, mend on Thursday, sweep on Friday, and bake on Saturday. Now, some of these things are exactly what most of you can learn to do, even when you are children.

8. To wash or iron many clothes, and to scrub very much, I agree with you, is too hard work for children, and it is sad to see young boys and girls who are obliged (because of the death of one or both parents) to work very hard to provide a home for the little sisters and brothers. No matter how brave these children are with their work, they don't have



play enough, and so get worn out and old-looking long before they should. Most of you, I am sure, are not troubled with too much work. It may even be very hard to get you to run cheerfully on an errand, or to do a little house-work each day, to clean the yard, or to put where they belong your books and playthings after you have done with them, all because you believe in play and not in what you call work.

9. Remember that work and play go together, and if you are well and will not work you have no

right to play. In some schools of which I know, some of the larger boys had a "strike," as they called it, would not work at their studies, and tried hard not to let other boys work, all because these first fellows wanted to have a longer noon recess, not for real play, but to idle away their time or to do mischief. Now, do you suppose for one single moment that, if these boys had learned how to work and play properly, they would have cared to make trouble in a school? No; the children who work well and play well are brave children, who are trying all the time not to be mean or idle, or to get into bad habits. They will "lend a hand" to others who can't work and play, and will grow up thrifty and become our best citizens. The other children are very likely to be among the worst, and when they die will hardly be missed.

10. There was a time when children at a proper age could be bound as apprentices to learn thoroughly a trade. Now there are very few apprentices, and the number of children who grow up to understand well any special trade is very small as compared with the number in the days of our grandfathers and great-grandfathers. To change this condition of things certain schools are now teaching various trades, such as carpenter-work, and how to make shoes, broom-handles, brushes, harness, lace, wire-work, ropes, rugs, and very many things besides. Every girl as well as every boy must look forward in life to doing some kind of work well. To be useful is of more impor-

tance than to be good-looking or to dress well, and the sooner we begin to be useful the better.

For Recitation.

1. How does all work and no play do harm? It shortens life by tiring people out sooner than they should be, and tends to make them gloomy or discontented.

2. How does all play and no work do harm? It shortens life also, for it tends to make people lazy, and to fall into bad habits, stealing, drunkenness, and the like.

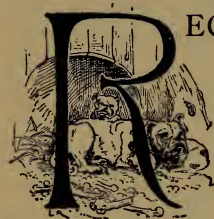
3. What happens to you if you do work and play as you should? The body grows stronger and the brain also.

4. What results if you don't have enough work and play, or if you have too much? The blood becomes poorer, the muscles weaker, there is less warmth in the body, and the parts of the body don't work well, and I get weak or sick.

5. What work can children do? Some kinds of house-work, and work in the garden, running of errands, and making themselves generally useful.

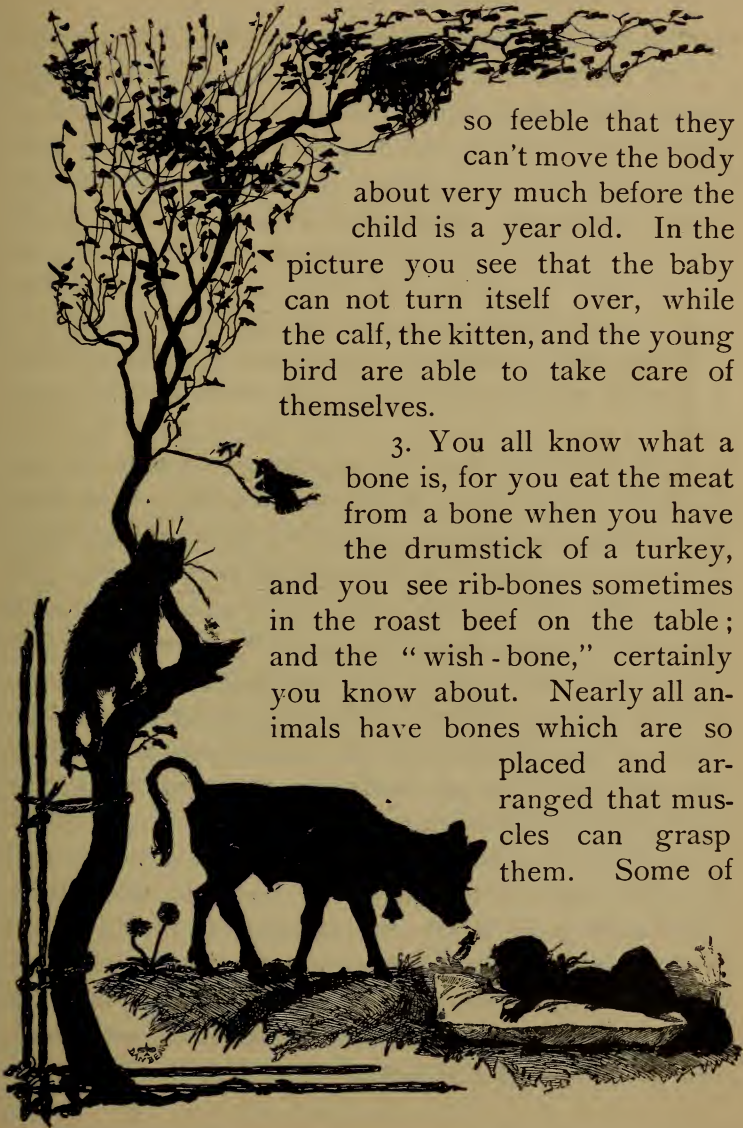
LESSON XII.

Our Framework.



RECENTLY, a little boy asked, "Why can't a baby walk in a few days after it is born, just as a puppy does?" Some of you have thought it strange that your wee little brothers and sisters don't play around and kick up their heels as young calves or lambs do. Some of you want to know, too, how it is that any one can work and play, can even move around, for food does not make people move, and blood, though it moves itself, does not move us. Nor can air, clothing, and bathing do it. All these things help to keep our bodies in such condition that they are always ready to move, but the real movers are *the muscles*, assisted by their servants, *the bones*.

2. But the bones and muscles would not move if it were not for the brain and nerves. Where they are and how they work you will be told farther on. The baby has muscles and bones, as a grown person has, but the bones are soft, and not strong enough to bear the weight of the body, and the muscles are



so feeble that they can't move the body about very much before the child is a year old. In the picture you see that the baby can not turn itself over, while the calf, the kitten, and the young bird are able to take care of themselves.

3. You all know what a bone is, for you eat the meat from a bone when you have the drumstick of a turkey, and you see rib-bones sometimes in the roast beef on the table; and the "wish-bone," certainly you know about. Nearly all animals have bones which are so placed and arranged that muscles can grasp them. Some of

the flat bones, by their joining together, make a kind of box to hold the brain. Others protect the lungs, heart, and other important organs. If we had no bones, we would be like the soft jelly-fish you may have seen at the sea-shore. If our skins were toughened to take the place of bones, as in some kinds of worms, or if in place of bones we had shells as crabs have, or gristle-like frames for our legs and arms as the butterflies have, we might look odd or even beautiful, but we would not be able to play and work in the way I feel sure most of you want to do.

4. The bones, as you see them in meat, are not just as they are in the animals during life. As you see them they are dead bones, like dead twigs of trees, dry, hard, and brittle. During life they are like the live wood, and though they are hard in older children and grown-up people, yet they bend somewhat when our bodies move, and are filled with juices, a part of which is blood. The outside as well as the inside of live bones is well supplied with blood, so you see bones in the body are not what you have probably thought them to be.

5. Bones are affected by food, drink, warmth, and exercise, just as all parts of the body are that have blood going to them and coming from them. If young children don't have enough to eat, or if they eat too many sweet, rich, or starchy things, and not enough food that has lime in it, the bones grow soft, and are easily bent out of shape. If you abuse your

blood by strong drink, your bones as well as the other parts of the body will suffer.

6. In the body there are about two hundred bones, some long, some short, some flat, and some thick. They do not lie around everywhere, but are joined together, and form what is called the framework or *skeleton*, which is necessary in a good many things besides animals. Most of the bones are joined together by bands called *ligaments*. These are strong, but yield like India-rubber when the bones are moved. The bones in the upper part of the head or skull fit into one another somewhat as a carpenter fits one piece of wood into another. It would not do to have anything but the strongest kind of joining here, where the delicate important brain is to be protected.

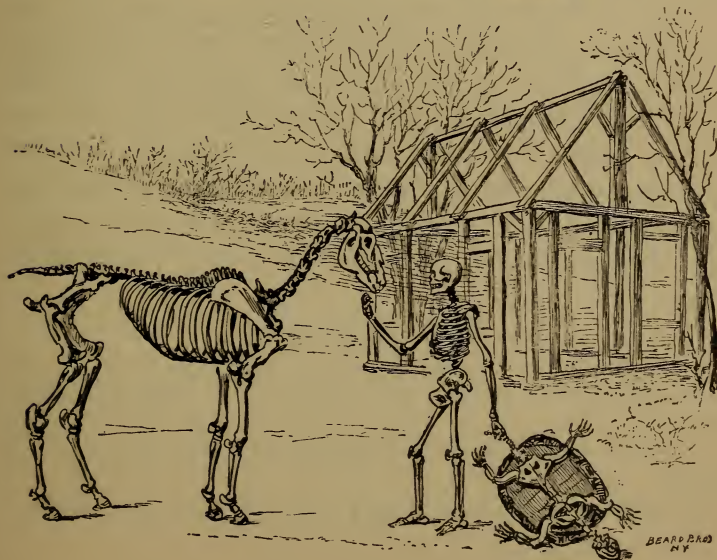
7. Where the bones are joined together the parts are called *joints*. We have toe-joints, ankle-joints, knee-joints, hip-joints, finger-joints, wrist-joints, elbow-joints, and shoulder-joints. In dolls, joints are generally of one kind, for it would make dolls cost a great deal if there were different kinds of joints. But in the building of our bodies only use and beauty were considered. At the shoulder the round upper end of the arm-bone fits into a sort of cup in the flat shoulder-bone or shoulder-blade, as the ball does into the cup, in the game of "cup and ball," and this joint is called a ball-and-socket joint. At the hip is the same kind of a joint, though the cup is deeper. This arrangement at the shoulders allows us to swing our arms about in almost every direction, if they are

not held down by tight clothing, and also the hip-joint lets us move our legs freely. At the elbows and knees the joints are somewhat like hinges, and are called hinge-joints. It would not do to have ball-and-socket joints at the knees, for, as soon as we should try to stand or walk about, the legs would fly out from under us, and then how we would look and feel!

8. In the joints that are movable (you already know that in the upper part of the head and in the hip-bones they are not), the bones are very smooth, and between and about them is a natural oily material, which, if we are in good health, keeps the joints greased, so that the bones can move easily upon one another. You know in sewing-machines, steam-engines, and other machinery, oil has to be poured into the joints to make them work well. Our machinery is oiled for us.

9. Boys have a trick of snapping joints, as they call it—that is, they pull on the end of the finger, stretch the ligaments, then let go the finger, and expect one bone to go back against another with a snap or click. This is not a safe thing to do, because sometimes the end of the finger will not go back, and then the boy is crippled.

10. Now, since you know what bones are, what they are for, and how well they are arranged to enable us to work and to play, I trust you will not say scornfully when you see or read about bones, “Oh, they are only bones!” There are persons who have



studied so much about how animals are made that they can tell, by merely looking at a few bones, of what animals they were a part. You know now that the skeleton is but a framework. This picture shows that the horse, the house, the tree, and the turtle have frameworks also.

11. If any of you think we ought to have had an outside skeleton to protect us, as the crab has, or that we should have had heavy plates of bones like the turtle, with an inside skeleton besides, just consider how the crab's shell comes off every year, and the crab is then left so soft and unprotected that he is hunted for, to be eaten. If you admire the turtle with his heavy armor, and would wish to be like him, think how slowly he moves around.

12. No; our framework is just the thing for us. It could not have been better built. All of the very important parts of the body are protected by the bones of the framework. With their aid we can have a variety of movements. The spinal column or back-bone, made up as it is of thirty-six bones, is so arranged that it protects the spinal cord, which runs through it, and yet allows us to move our bodies freely.

For Recitation.

1. How do we move? By means of our bones and muscles.
2. What moves the bones and muscles? The brain and the nerves.
3. Why are babies more helpless than the young of many ani-

imals? Because they grow slower and do not need to move about as soon.

4. What are bones? They are hard substances, but at the same time elastic. They give support to muscles and other parts of the body, and protect important organs, such as the brain.

5. Is there any difference between the bones in an animal's body during life, and after they have been removed from the body? Yes; in the body they are alive, and have blood going through them.

6. How do bones grow and keep in good health? By means of food, exercise, and rest.

7. What is meant by the skeleton of the body? It is the framework, made by the joining together of bones.

8. Has anything else a skeleton besides the human body? Yes, many animals and plants, as well as houses and other things.

9. What are the places called where the bones join? Joints.

10. How many bones in the body? About two hundred.

LESSON XIII.

How we Move.



VERY part of the body is moved by means of muscles. The muscles that set the head, trunk, and limbs in motion number about four hundred. They are of many different shapes, according to the work they have to do, and are put over the skeleton in layers. This arrangement provides for many muscles in a small space, and helps to keep the outside of the body smooth and beautifully rounded. Suppose you had a wooden skeleton of a doll, as large as a baby, with bones and joints made just as a baby's are, and you wanted to make the skeleton move and be of some use. Suppose, again, that some fairy should give you four hundred muscles to put on the skeleton; you would very soon find that you could not put them on without making the body have humps all over its surface.

2. In a baby there are as many muscles as in a grown person, but they are used very little, and so are neither large nor strong. Then, too, fat, which a baby needs so much for warmth, covers the muscles



and hides them. As the child grows older, its muscles grow larger and stronger; and if it works and



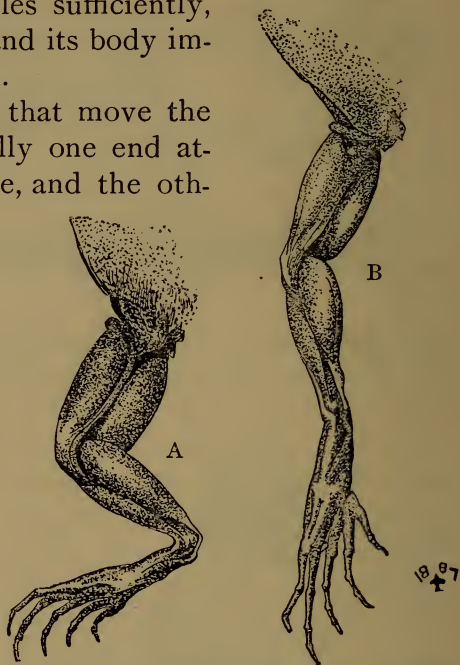
Properly developed.



Improperly developed.

plays, and thus exercises as it should, the fat disappears to a large extent, and the outlines of the muscles begin to show through the skin. The child's body is then said to be properly developed. If it has not used the muscles sufficiently, the flesh is flabby and its body improperly developed.

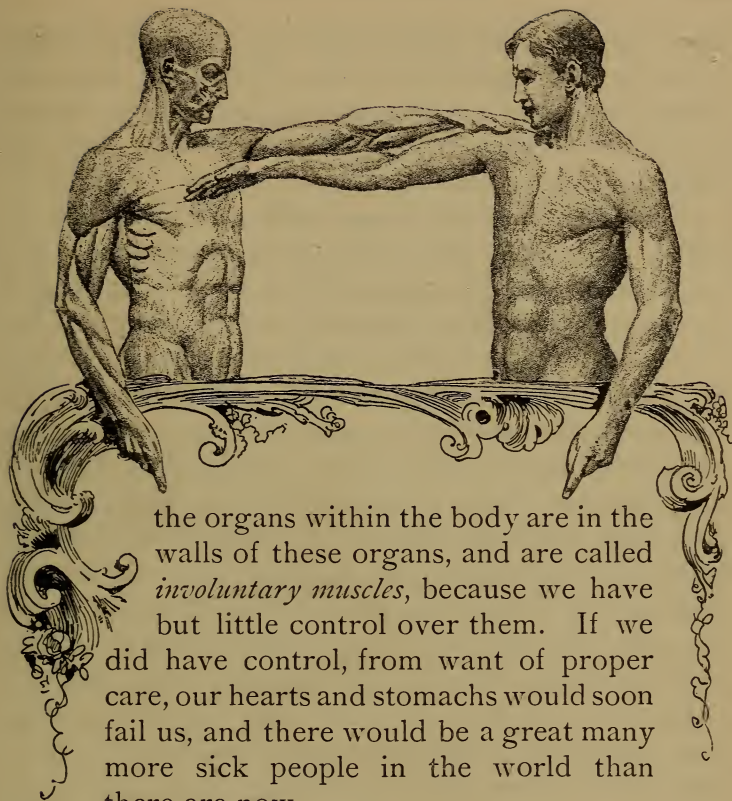
3. The muscles that move the body have generally one end attached to one bone, and the other to another; and are somewhat like rubber bands that close a gate or door. When one of the bones moves toward the other, the muscles that do the moving shorten, and swell from side to side; whereas, when one bone goes away from another, the muscles grow longer.



Frog-leg: A, muscles contracted. B, muscles at rest (Sewall).

In this picture of the legs of a frog in motion and at rest you can see how muscles act.

4. The muscles that move our heads, trunks, and limbs are called *voluntary muscles*, because they are under the control of the will. The muscles that move



the organs within the body are in the walls of these organs, and are called *involuntary muscles*, because we have but little control over them. If we did have control, from want of proper care, our hearts and stomachs would soon fail us, and there would be a great many more sick people in the world than there are now.

5. Muscles, in order to grow strong and be able to do their work, must be used properly. Think how many kinds of work our bodies should do, from the most delicate to the heaviest and most severe. Here are pictures of a man, with his skin on and with his skin off. He has trained to grow strong. See how the muscles show through the skin, and how large they are! There is but little fat. Most of us,

however, do not need to train so as to have larger muscles than everybody else. What we want are strong, firm, but elastic muscles that will enable us to work well, play well, digest well, breathe well, and have our hearts work well.

6. We don't want strong arms and weak legs, or strong legs and weak arms, or a strong heart and weak lungs, but we want every part to be strong if possible. Some of us can never reach that point, but we can all aim at it. We certainly can never be strong all over if we use only one set of muscles. Birds, like ostriches, that are compelled to walk a great deal, have very strong legs. Birds that fly have very strong muscles attached to the wings. Fleas and frogs and kangaroos, that hop on their hind-legs, have the hind-legs very strong. The blacksmith, who swings heavy hammers and works mainly with his arms, has the arms very strong, though his legs may be weak; whereas the man who runs, walks, or dances for a living, generally has very strong legs. But, as already said, what we need is to have all the parts strong, each according to its place and work.

7. If any of you that are now strong have been very ill for a number of days, you know how weak you were when getting well; you were hardly able to stand, because during your illness the heart did not pump as strongly as when you were stirring around; the blood could not be sent into the muscles as thoroughly; the food you could take was not

sufficient to make the blood rich with nutriment; and the nerves were too weak to carry orders from the brain to the muscles to do their work, so the muscles were not used much and became weak. When you attempt to walk after such an illness, it is somewhat as if a baby were learning to walk. You find that, even to stand, a number of muscles must relax, and a number of muscles must contract or grow firm. It is months before a baby can control all its muscles so that it can stand.

8. Most of the acts we perform (things that we do), even so apparently simple a thing as buttoning a coat or picking up a lead-pencil, sets several muscles to work. Sometimes children, when reciting their lessons in school, try to stand or balance themselves on one leg like geese, but geese can beat you at this, for they have acquired the habit of so standing. Your muscles should be so strong that you would be able to hold yourself erect on both feet for a short time at least.

9. Sometimes children use certain muscles so much that those muscles become strong, while others, that should be used frequently, but are generally left unused, become weak. For instance, some of you think it is very funny to look cross-eyed, and you practice this way of looking until the muscles whose duty it is to pull the eyes inward become too strong, while those whose duty it is to pull outward become weak, and so the habit of looking cross-eyed is settled on you.

10. Some of you "look sour" so often at the slightest thing which happens to displease you, that the muscles which pull the corners of the mouth down and pout the lips and wrinkle the forehead become too strong, and the longer you practice this looking sour the harder it becomes for the other muscles to make you look pleasant again. Some of you laugh so much at the slightest thing that you are ever on the grin; so easily do muscles by frequent use become developed. So children who frequently whine because they can not have what they want, and beggars who cry when they are trying to make people help them, make certain muscles grow at the expense of others. What a blessed thing it is that dolls can not whine and pout, and cry and stamp their feet! What would become of us all if they could?

11. I am sure that by this time you all see the importance of making strong as many muscles in the body as possible, so that you can use the left hand as well as the right; so that you can use thoroughly your eyes and ears, and see the beautiful things about you; so that you need not cry or laugh when doing so is out of place. There are several things which will make the muscles weak and so unsteady that they can not work and play as they should. Such are sickness, laziness, and the frequent use of tobacco and stimulating drinks, such as strong coffee or tea, and liquids containing alcohol.

For Recitation.

1. What do muscles do besides moving us from place to place? They move almost every part of the body, both inside and outside of the skeleton.

2. How can muscles make the body move? They move bones, and so bend the joints.

3. Why can not a baby move about as readily as a child several years old? Because his muscles are not so strong.

4. What is meant when it is said that a boy's body is not properly developed? That his muscles are not strong enough for him to work and play as he should.

5. How can they be made strong enough? By using them each day, but not so hard as to weaken them.

6. What are voluntary muscles? Those we can generally control?

7. Why are not the heart, stomach, etc., under our control? Because it would not do to trust the working of these organs to us. We might be careless.

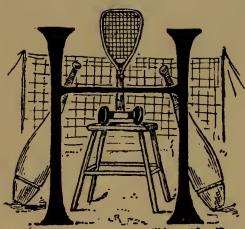
8. What do muscles need, besides use or exercise, in order to grow strong? Rest.

9. Is it well to try to make only one set or a few sets of muscles strong? No; we should try to be strong all over.

10. What will weaken the muscles so that they can not work as they should? Idleness, too hard work, smoking, drinking of alcoholic liquors, of much tea and coffee, eating too much, and living indoors most of the time.

LESSON XIV.

Rest.



OW are you to make your muscles grow strong? You say: "By work and rest. We use them in work and play, and in such exercises as calisthenics." I am afraid if it were not for the calisthenic exercises which now-a-days are a part of the work in most schools, some children (those who don't like to work and play) would keep their muscles soft. Those children best develop their muscles, and at the same time their brains and hearts, who enter into their work and play as if they liked it—were real fond of both.

2. I do not mean that you should *always play* the romping, lively games, such as "tag," "I spy," and "puss-in-the-corner"; or such games as base-ball, cricket, hare and hounds, etc.; or that you should *always do* that kind of work which makes your muscles work the hardest, such as heavy lifting, pulling or pushing, or carrying big loads on your shoulders. No; such work and play, continued for a long time each day, will surely make Jack a dull boy, for it

will tire out his young muscles, and weaken them, even if it does not lay him up in bed sick.

3. You know of children who have played very hard and long on a Saturday because it was a holiday, and then, when they were tired and hungry, ate a good deal and very fast, and so could not go to church or Sunday-school, but had to lie in bed for two or three days. Such exercise is foolish. You have heard of strong men who, because they were strong, thought they could do anything they wanted to with their bodies, and they kept on hour after hour, rowing, running, walking, or riding horseback very hard, until the muscles on the skeleton were so tired and weakened that some of them tore apart. So, suffering was the result, or, worse still, the overstrained hearts grew so tired that they stopped pumping the blood that had come into them, and the men died.

4. Strongly and beautifully as we are made, we can not do everything we would like to. With exercise, as well as food, clothing, and bathing, we must be TEMPERATE. In certain trades only one set of muscles is mainly used; those of the arms in making knife-blades, nails, and horseshoes, and those of the legs in sewing-machine work and scroll-sawing. Some of the people working at these trades work so long and so hard, and take so few holidays, that they tire out the muscles of the arms or legs, tire their hearts, tire their whole bodies, and grow sad and sick. *Everybody needs rest.*

5. What a good thing it is for children that there

are some quiet games as well as the romping ones; such games as "dolls'-house," and "party," "button-button," etc.! What a blessed thing it is for those who are



compelled to work hard to support themselves and their families, that Sunday is a day of rest, and that there are holidays! Children and grown people who do not enjoy their work and play, can not enjoy their Sundays and holidays as they should.

6. One of the saddest sights I have ever seen was a number of little people from an institution, who had come to the sea-shore to spend a few days, who had not learned how to play, and who were not allowed to rest by sitting on the sand, for fear they might soil their aprons and dresses. They moved about with scarcely a smile on their faces, while other children about them were like so many young colts

in their friskiness. In the city home of these little old people they were obliged to be kept clean nearly *all* the time, so that they would be ready for visitors, and though they were taught little games and songs to go with them, when they played the games and sang the songs it seemed just like playing funeral.

7. What do the quiet games do after we have romped; of what use are Sundays and holidays, and change from one kind of work to another? All help to rest our muscles and our whole bodies. If the upper rooms of our busy hearts didn't get a chance to rest while the lower ones were emptying themselves of blood, and if the lower ones didn't rest while the upper ones were working, our hearts would wear out very quickly, and very few of us would ever grow up to be men or women.

8. When a man works very fast and long, he doesn't give his heart a chance to rest, and so the poor thing gives up in despair, and refuses to be driven so hard. The kind of rest the heart needs is a different sort of rest from that the stomach needs. The stomach wants several hours at a time before it begins to work over the food that the next meal brings into it, whereas the heart is content with a second here and a second there. And so I suppose it is with all parts of the body. One portion needs one form of resting-spell, another another form, because they do different work.

9. There is no grumbling in health, either because there are different kinds of labor or different

kinds of rest. In health all parts work together in harmony, obeying the master, the brain, and for one purpose, to make the body strong and well. It is because our muscles and entire bodies need rest as much as they need exercise, that if we care for our bodies as we should, we give them the opportunity to rest, for they can not rest unless we let them do so. Because human beings are far above the lower animals in what they can think and do, God has given them the power of choosing for themselves what they will do, and sometimes they choose the wrong way.

10. If we are wise, we will choose the right way, and so, for the sake of rest, mix in quiet games with romping ones. So, for the sake of rest, if we are tired of sitting, we will walk or have some calisthenics. If our brains are tired studying geography or history, we will rest them by studying something entirely different. So change of work as well as change of play is restful. "Yes; but what about Sundays and holidays?" some one asks. "We can lie in bed and do nothing all day long, can't we, on these days?" No, doing nothing all day long is not resting, but is being lazy.

11. The fact is, that people who look upon Sunday as a day for idleness, generally eat too much, or drink too much, or both, so that they don't feel like going to work on Monday; whereas, if part of the day is spent in the house of God, or in doing good to others, how refreshed we are for our usual work on Monday!

Too many persons look upon Sundays, holidays, and half-holidays as opportunities for a carouse. How much more pleasure and strength might we have from holidays if all the members of each family would observe them together in a change of work, and in healthful recreation, or play!

12. Rest is so important for us that we get sleepy about the same time each evening, that is if we are healthy and take care of ourselves. The sand-man comes around about every night, piles the sleep-sand on our eyelids, and we go "nid-nodding," and, before we can say Jack Robinson, are on the way to dream-land. How quietly and sweetly healthy babies sleep, and the nearer our sleep can be like theirs the better, with no horrible dreams and nightmares to disturb us; if dreams at all, none but pleasant ones! Children who eat hearty and rich suppers or dinners at night, or who go to evening parties and eat even a little of everything on the table, don't as a rule sleep easily. Liquor-drinking and everything that makes people keep late hours, rob them of sleep and shorten life.

13. "Early to bed and early to rise makes a man healthy, wealthy, and wise," is just as true now as it ever was. Every one of us should sleep, if possible, during the still and dark hours of night, and get up as soon as we wake. If we do this we rest and also save about two hours a day for work, and this means thirty days every year—just think of it! All about us we are taught that if living things are to be

healthy, they should have quiet sleep. Most of the flowers fold their petals and their leaves curl up as night comes on. Birds nestle down upon the branches, ruffle up their feathers all around them, and sometimes put their heads under their wings.

14. Puppies and kittens, and young animals everywhere, lie close to their mothers for warmth and protection while asleep, and little children are glad to cuddle down in their comfortable beds when the work and play of the day are over. But remember, children, that we can't enjoy rest and sleep unless first we have worked. It is work and never idleness which entitles us to rest. When you grow up, remember how important it is to work in work-time, play in play-time, and rest in the rest-time. If you remember all this, you will do your own work well, you will help others to do theirs, and when you come to die, death will be only the long sleep, the rest from which you will enter upon a new life above.



For Recitation.

1. Is it very hard work and very hard play that is needed for health and strength? No; it is the work and play that we can do each day without tiring us out.

2. What is one way of resting your tired body? By using the brain in reading or even studying.

3. How can you rest a tired brain? By playing some game, especially an out-door game, or by working with the hands.

4. Is there any other way of obtaining rest besides changing work or play? Yes; in quiet sleep.

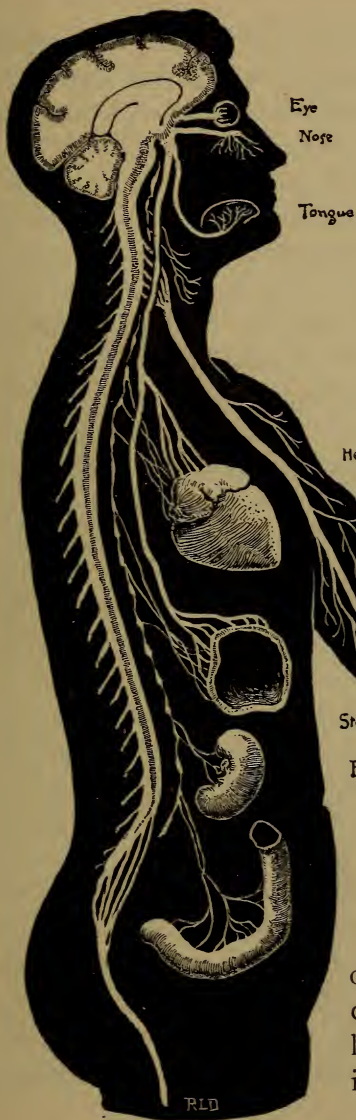
5. Who best enjoy rest? Those who have done good work.

LESSON XV.

The Brain and the Nerves.



VERY house which contains a large family is likely to be in much disorder, unless there is a head to the household, and unless the members of the family work and play together in harmony. In the house that each one of us lives in—that is, our body—there is a very large family—lungs, heart, stomach, liver, intestines, kidneys, bladder, bones, muscles, eyes, and teeth. Besides all these there are hundreds of little glands which keep parts of the body moist, and thousands of little cells. Each organ and cell has its own work to do. As long as we are healthy, and try to keep ourselves so, all this large family work together harmoniously; but if we are sick or don't take care of our health, there is disorder; one member of the family does not work well, then another and another, and finally, unless order is restored, *all* of our machinery is disarranged, then stops, and we die. It is the doctor's business to tell people how to keep healthy, as well as to try to put their machinery in order when they are sick.



2. In our bodies *the brain* is the head of the house, and *the nerves* act as telephone or telegraph wires to carry messages from the brain to all parts of the body, and from one

part of the body to another. Without the brain and nerves

the heart would not pump, the lungs would not take in or squeeze out air, and the

other parts of the body would not do their work. The brain is at the very top of the body, in the strong bony box or skull. The outside of the brain is of a light, brownish - gray color, and looks something like an English walnut. The inside is smooth and white,

like blanc-mange. But if you could look at this white material under a microscope, you would find that it is made up of very many little fibers or threads, coming into or going out of the brain.

3. From the under part of the brain there hangs down in the middle of what many call the "backbone," a large, white, rounded cord called the *spinal cord*. It contains some of the nerve-fibers which go to and come from the brain, and as it hangs it looks something like a Chinaman's queue. In the center of the spinal cord there is a brownish material, like that on the outside of the brain. It may be said to look something like chocolate blanc-mange, but under the microscope is found to be curiously-shaped cells. These cells, found not only in the spinal cord and the covering of the brain, but also in spots in the brain and elsewhere, are like so many telegraph or telephone stations, for in them one end of the nerves ends.

4. This picture shows a section of the body, and you see half of the brain and spinal cord and some nerves connecting the nose, the tongue, and an eye with the brain. You see also a nerve and its branches in an arm, and coming off from the spinal cord you see nerves, which are shown cut off. These last went to and from the muscles of the arms, legs, and trunk—that is, to the muscles on the outside of the skeleton. In front of the spinal cord is a long nerve coming from the brain, and sending branches to the throat, heart, stomach, and parts thereabout. It is so long,

and goes to so many places, that it is called the *wandering nerve*. It has charge of the movements of some of the organs in the chest and abdomen, and holds the heart in check.

5. The nerves which start from the gray matter in the brain or spinal cord, and go to various parts, are called *nerves of motion*—that is, nerves by which word from the brain or spinal cord is sent to the part to move. Those coming from the parts to the brain are *nerves of sensation*, or feeling—that is, nerves by which the parts tell the spinal cord or brain that they are tired, sick, hungry, or hurt. The use of all this you will see by-and-by.

6. In the picture you also see some fine white threads or nerves which pass from the heart, stomach, kidney, and intestine, to little spots, or lumps arranged in a sort of chain, between the spinal cord and the wandering nerve. The spots should have been gray, for in reality they contain nerve-cells. It is through these delicate nerves and cells that the heart and blood-vessels are able to act.

7. So faithfully do the nerves and cells work that, if we are in health, we do not ordinarily feel our stomachs or our hearts move, and we know very little of how the machinery inside of us is working. How fortunate this is for us! But if we get into the miserable habit of feeling of our pulses, of watching how we breathe, and of paying too much attention to ourselves, we imagine all sorts of foolish things, and little by little the brain and the nerves grow weaker.

Then the members of the family begin to be disorderly and not to work in harmony, and we are very uncomfortable, to say the least. All this can happen, for the very delicate cells and nerves are connected with the larger nerves, and so with the brain.

8. *We know* about things that happen both outside and inside of us, only when some nerve brings word to the brain, that is, reports to headquarters. It is the business of the brain—1. *To think* what is to be done, what is to be learned in the world; 2. *To remember* especially those things that are useful for us; and, 3. *To will* or *direct* the body where to go and what to do. So the brain is the head of our house, and it makes a great difference to us what sort of brain we have. If we have a good brain we are clear-headed, and that means *doing our own business well, and not interfering with other people's business.*

9. If the brain becomes muddled we are in a bad plight. There is nothing that so frequently muddles the brain as alcohol. Under its influence the brain gives wrong orders, and does not understand messages sent to it. The person eats what he should not, sleeps where he ought not to, goes where he should not, and acts as he would not in his sober senses. He abuses his children, injures his wife, and even kills his best friend. Sometimes alcohol deadens the life of the brain, and produces deep, unnatural sleep, and the person is said to be dead-drunk.

10. Whenever the doctor is called to attend any one in this condition, he must feel as if it would be

better if the person were really dead ; for the doctor knows that the habit of drinking is such a strong one that the man will probably, as soon as he arouses from the sleep, go to drinking again and again, and so gradually destroy himself and cause misery among his friends. Sad as it is for a man to become a slave to drink, and for his brain to lose control of his body, it is sadder still for a woman or a child—as is sometimes the case. Alcohol has such power that it pulls down the brightest and finest-looking people, as well as the stupid and bad-looking, and in both cases the brain *thinks but little good, remembers but little good, and does but little good.*

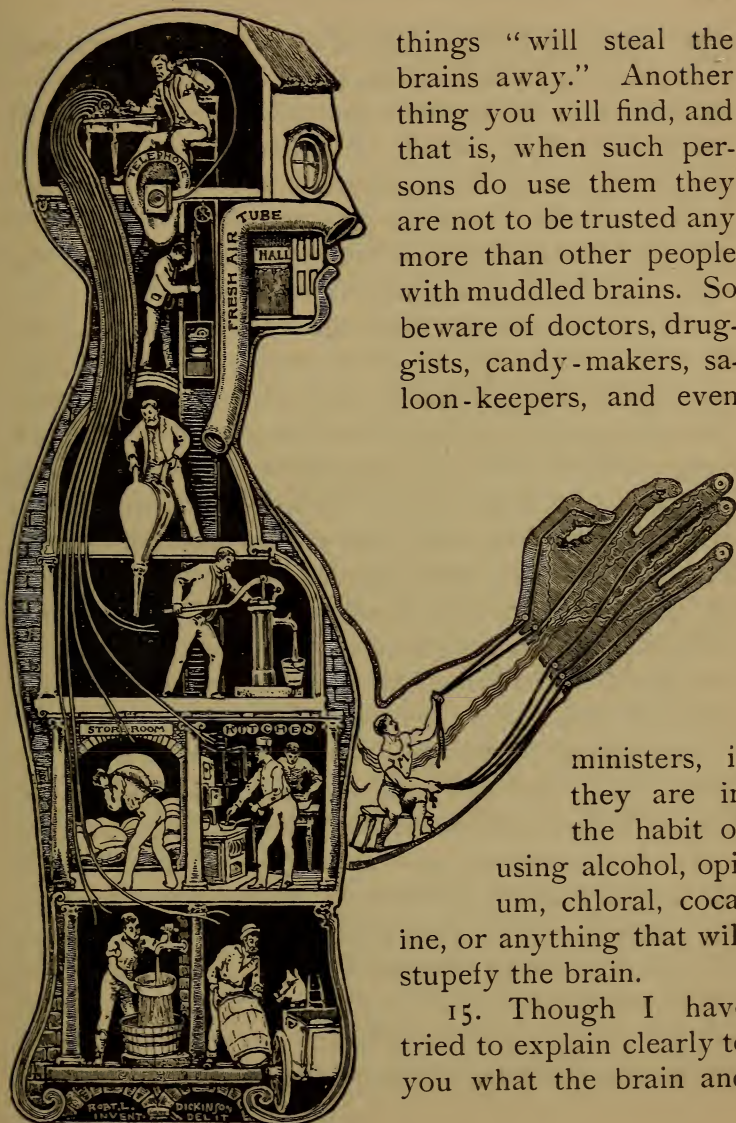
11. Besides making the brain lose control of the different members of the household, alcohol inflames and weakens the members, the muscles, heart, lungs, etc., so that they can not work in harmony and obey the brain, and so disorder reigns. And surely, if the head of the house and the other members work against each other, the house must fall. Sometimes it is the stomach that gives out first, and refuses to digest even the simplest food ; sometimes the heart, instead of quietly and beautifully going on with its work day after day, begins to pump, now too fast, and then too slow ; or it may be that the kidneys refuse to strain away dead material, and the liver to dispose of the fat and other rich food.

12. *Tobacco* is another thing which upsets the brain. With children especially, whose brains, as well as their muscles, bones, hearts, and other organs, are not de-

veloped, therefore not strong—anything like tobacco or alcohol (unless the latter is given as medicine by a careful physician) is very hurtful. For these things make the brain lose control over itself and the body, and start bad habits, which frequently lead to misery and death, just at a time when loving parents and friends had hoped to see happiness, health, and honor.

13. There are other things besides tobacco and alcohol which deaden the brain, and which are sometimes foolishly used by people to make them forget pain or worry; but these things, though of great use as medicines when ordered by careful doctors, are poisonous by nature. Just as it is with alcohol, the frequent use of these things creates a desire for more. The person can not resist the craving, and becomes an *opium*, *chloral*, *chloroform*, or *cocaine* drunkard, of little use to himself or others, and puts himself lower than any beast of the field.

14. Just as there are persons who will make for sale candies with alcohol in them, so there are druggists who will sell paregoric, cordials, and soothing-sirups, and cocaine-lozenges, without telling the buyers that the poison opium is in the paregoric, cordials, and sirups, or the poison cocaine in the lozenges. Children, as you grow older you will find that generally the persons that sell liquor or poisonous candy, or poisonous drugs, *do not themselves use them to any extent*, for they know that the frequent use of such



things "will steal the brains away." Another thing you will find, and that is, when such persons do use them they are not to be trusted any more than other people with muddled brains. So beware of doctors, druggists, candy-makers, saloon-keepers, and even

ministers, if they are in the habit of using alcohol, opium, chloral, cocaine, or anything that will stupefy the brain.

15. Though I have tried to explain clearly to you what the brain and

nerves are, and what they are for, perhaps you will have a better idea of them when we study together this picture. As in the other picture, only a few of the nerves can be shown. The artist has shown only the nerves, or, in the picture, the wires, that go from the brain to the muscles of one arm, and to the rooms occupied by the lungs, heart, stomach, and small intestine, the liver, kidneys, and large intestine.

16. In the head is the brain or *superintendent*. In his office, close by him, is a telegraphic apparatus, which he is using, and a cabinet with drawers, which hold a quantity of motion, thought, ideas—those things which some of the cells in the brain have charge of and store up for future use. Some of the wires that go from the telegraphic instrument you see. The cabinet of drawers and the very fine wires that go to the drawers, and to the internal organs, are not shown in the picture. You see the window or eye in the head through which the superintendent can look out, and by which is brought to him the knowledge of many beautiful pictures in the world about him. You see also the ear telephoning, we hope some good news, to the brain.

17. In the throat you see *the palate* or *janitor* of the house, sending down food by a dumb-waiter to the stomach. Below the palate is *the lungs*, sending air with his bellows to all the other workers in the house, and getting his supply from out-of-doors, *through the nose* and windpipe, or air-shaft. The worker near him pumping so constantly and quietly

is *the heart*. In a room below these two busy workers are *the stomach and small intestine*, hard at work preparing the food that has been sent down through the gullet or food-tube, so that the other workers in the body as well as themselves shall have something to keep them strong and well. In another room, close by, is a workman, *the liver*, storing away food that is to be slowly used for fuel and strength.

18. In the lower story of the house are important but frequently much neglected workmen, the large intestine and the kidneys, whose duty it is to carry refuse food and dead material out of the body. In the arm is a strong man who has charge of the muscles, which move the hand and fingers. At the ends of the fingers the artist has put little buttons—push-buttons as they are called—to represent the ending of the sensitive nerves in the skin. The sensitive nerves end in little knobs in almost every part of the skin, and so it is just as if there were really push-buttons. If the knob is pressed upon or cut into, or anything hot or cold touches it, a sensation travels inward to one of the brain-cells, and an order goes out to the muscles to move the part away, so that it will not be injured.

19. I wish the artist could have shown in the picture other workers, the skin, bones, glands, etc. Of course, none of you must think that there are real live men in the body. In the picture the workmen represent the organs. They can be controlled by the superintendent, through wires or nerves, some

of which you see leading from the superintendent's rooms to the rooms the workmen are in. When the brain looks out of his windows, the eyes, and sees a ball which some one has thrown coming toward the head, he says the head must dodge that ball, or it will get hurt, so he telegraphs to the drawer which has charge of the muscles of the head and neck, "Make those muscles move quickly, or that ball will give them a thump!" The drawer sends out word to the muscles, and the head dodges the ball.

20. The stomach sends word to the brain that it is getting hungry, as are all the workers. So the brain telegraphs to that part of the cabinet that moves the legs and arms and jaws and gullet, "Send the legs to market and home again, tell the arms and hands to get something ready to eat, tell the grinders to grind the food well, and then the gullet to swallow it slowly, for the stomach and the other fellows below are hungry, and must not be trifled with." The body is in the midst of bad air, the lungs tell the brain that it is getting to be hard work to breathe, and that he is becoming drowsy, and is afraid he is being poisoned. The moment the superintendent receives this message, if he is wise, he immediately sends word to the muscles of the legs, through a drawer in the cabinet, to hurry the body away from such air, and to the muscles of the chest to pull the chest out and in faster, so that the lungs can more quickly breathe in what pure air there may be, and more readily send out bad air.

21. Now, children, you must see by this time how important it is that the superintendent and all the other workers should be calm and cool, and know what they are about. If the superintendent or master-workman is muddled by drink or anything else, he can not superintend as he ought; he doesn't see dangers, smell, taste, hear, or feel dangers, and can not send correct telegrams to the workmen, or know what they mean when they send word to him. If the heart or lungs is muddled, he works by fits and jerks, and so fails to send enough blood or air to the other workers, and then their health fails.

22. If the stomach or small intestine is muddled, the food is not properly prepared, and the workmen are poorly fed. If the liver is thickened, and so can't work well, he fails to store up food, and do his other work, so that soon his room becomes cluttered up and the body loses some of its warmth, the tongue becomes coated, and then the person the liver belongs to is said to be bilious. If the kidneys and large intestine don't do their work and get rid of the refuse, all the workmen in the body become poisoned.

23. Though, fortunately for us, most of the work in the body is carried on without our knowledge, still the healthy brain stands ever ready to help. When we almost lose our footing in the street by stepping on a banana or orange skin, word is sent through push-buttons in the feet to the cells in the spinal cord, and the muscles of the leg very rapidly do as they are told, attempt to brace us up to keep

us from falling; but, if we don't easily regain our footing, word is sent from the foot up to the brain through the spinal cord, asking for assistance, and then other muscles besides those of the leg are told to assist those of the leg. So, whether we know or do not know of the work that goes on in the body, it is important to have a well-trained brain, and that means to have self-control.

24. We can not in a short time learn to have self-control, but we can keep on trying and trying until we do learn. Don't always cry or whine when you are asked to go on an errand; don't get into the habit of fretting because you can not have what you want; do not worry for fear that you will be late at school; do not scold about little things. Simply find out what your duty is, and try to do it, "and if at first you don't succeed, try, try again." In this way you will make your brain and nerves strong, and put them under control, and then you have accomplished much. You should use your brain, nerves, and muscles every day, then they will grow strong sooner than they will if used by fits and jerks—that is, spasmodically.

25. In such simple games as "Simon says thumbs up, Simon says wiggle-waggle," one child will not lose his temper, and will play better than another, because he has more self-control. If, as he grows older, he continues to exercise his self-control, his superintendent becomes stronger and he will be best able to do the hard work of life. The person with but little self-control is nervous and irritable, or as a

little child once said, "in a hurry all over," ever ready to whine, cry, laugh, scold, or fret, but seldom ready to do the work he has to do quietly and without fuss. *To be cheerful and hopeful, and to do good to others as well as for ourselves*, are three very good ways of encouraging self-control, and it will do you all good to study this motto:

"Look up and not down;
Look forward and not back;
Look out and not in,
And lend a hand."

26. Before we close this lesson on the nervous system, there are three things to which I want to call your attention: 1. Don't ever hit any one on the head, or push any one down so that the head strikes against anything hard; such a blow or fall may injure the brain and nerves. 2. Do not punch, strike, or kick any one in the abdomen, for a blow there may injure delicate nerves and cells, or cause death. 3. Remember that most animals feel pain, and that they know what kindness is.

For Recitation.

1. What is necessary in a house if everything is to work smoothly? That there should be a good head to the house, and that the members of the family should work in harmony.

2. What is the head of our house called? The brain. What other name has this head? The superintendent.

3. What are the members of the family? The heart, stomach, and every part of the body that has work to do.

4. What are the duties of the superintendent? To think, to remember, and to act.

5. How can he do all this? By means of nerves, which carry messages to him from all parts of the body, and from him to all parts.

6. Can the brain think, remember, and act well if it is disturbed or not clear? No, for it will not know as it should what messages are brought to it, or what messages it should send to the parts or workers in the body.

7. Can the workmen act in harmony if they are disturbed? No, for they will be unfit to tell the brain when they need more food or air, or are sore or ill.

8. What especially affects the brain and nerves, so that they don't work well, and so cause disorder and disease? Alcohol, tobacco, chloral, chloroform, cocaine.

9. By what other means can you weaken your brain and nerves? By acquiring the bad habit of being peevish, of crying, of being selfish, of becoming slaves to our appetites, passions, and desires.

10. How can you strengthen your brain and nerves? By being contented, looking on the bright side of things, and learning to live for others as well as ourselves.

LESSON XVI.

The Senses.



HE aches, pains, discomfort, and bodily distress which we have when we do not take care of our bodies are called *sensations*. These are conveyed to the brain or superintendent by the sensitive nerves. I trust that you will so take care of your bodies that you will have very few if any such sensations. But there are sensations which come to the brain through specially arranged nerves and organs—which sensations, I trust, will be enjoyed by you. They are called special sensations, or special senses, or sometimes only “the senses,” and are generally spoken of as five in number—touch, taste, smell, hearing, and sight. The parts or organs through which they act are the skin, tongue, nose, ears, and eyes.

These organs, with their nerves, are so important that they are called “the gateways of knowledge,” “the working-tools of the brain,” and the more careful we are of them, and the better we train them, the more happiness and comfort we shall have in life.

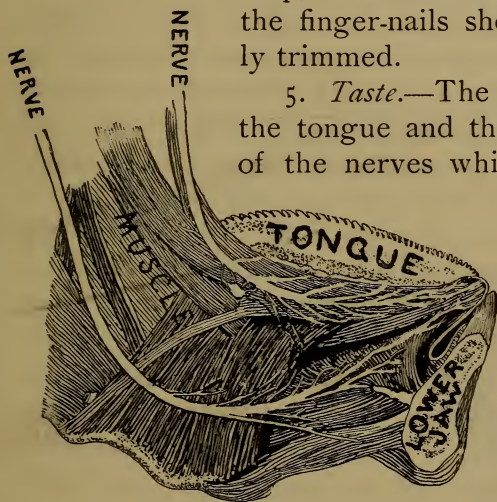
2. There are children and grown people who do

not use their eyes to see the beautiful things about them, only the disagreeable things. They do not try to hear cheerful and pleasant sounds, only clashing, discord, and bad language. They have noses, but they do not learn as they journey through life that the agreeable odors are as numerous as the disagreeable ones. They have nerves in the skin to feel with, but they blunt their sensibility by rough usage, and so can only feel the roughest of objects. Though they have tongues, they will persist in wrong habits of eating and drinking, and so destroy or dull the taste for healthful, harmless, and delicious food.

If the organs of special sense don't report correctly and frequently to the brain what is seen, smelled, heard, tasted, or felt, the superintendent can not store away knowledge in his cabinet, to take out and use whenever he feels like it. He will spend most of his time in looking after himself, and so will be a very selfish fellow.

3. *Touch*.—The sense of touch is the one by which we learn whether anything is large or small, square, round, or oval; whether it is soft or hard. This is accomplished generally through the fingers—by means of the little push-buttons, or ends of sensitive nerves—though we can feel with the tip of the tongue, and other parts of the body. Persons without hands may, by frequent use, develop the sensitiveness of the muscles and skin of the toes, so that with the toes they can pick up very small objects, sew, write, and even take articles out of their pockets.

4. The sense of touch becomes very sensitive with many blind people, who learn to read easily by passing the fingers over raised letters, to play the most difficult music on the piano, violin, or harp, to recognize people by feeling of their faces, and to tell what the various colors are in a shawl. It becomes impaired when the fingers are cold most of the time, or have been frost-bitten, or when they are roughened by dirt or clothes-washing. To keep the hands in good condition to use tools, to sew, write, draw, and to do readily many things we want to do, they should be frequently washed with soft water and a mild soap, or with oat- or corn-meal, and the finger-nails should be kept neatly trimmed.



5. *Taste*.—The upper surface of the tongue and the sides, by means of the nerves which come to them,

convey the sensation of taste to the brain. Look at some one's tongue through a magnifying-glass, and you will see hundreds of velvety points, in

many of which there are little nerves of taste. If the tongue is not clean, and these points become coated,

as they generally do when you are ill, or when you have eaten too rich food, you lose your appetite for good healthy food. When the tongue becomes coated or furred, the little points or taste-buds, as they are called, are loaded down so much sometimes that the fur can be fairly scraped off. The use of the tooth-brush, and the frequent rinsing of the mouth with water, or with water with one fourth lime-water added, will be of service in getting rid of the fur.

6. Not only should the tongue be clean, if we are to taste well, but the food must be broken up, and at least partly dissolved. These things will be done if the food is thoroughly chewed, and mingled with the saliva by rolling motions of the tongue. If you glance at this picture of the tongue you will see how many muscles there are ready to move the tongue about. Frequent smoking and the use of alcoholic drinks, chewing tobacco, chewing-gum, mustard,



The inside of one half of the nose.

saucers, and highly-seasoned food, tend to dull the taste, and so much of the pleasure of eating is diminished.

7. *Smell.*—The sense of smell is most acute in the upper part of the nostrils, where the nerves of smell are mainly distributed. Therefore, to smell well, delicate as well as strong odors, it is necessary that

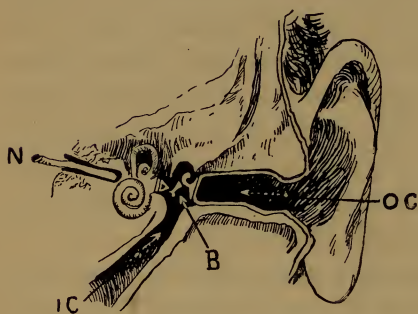
the nostrils should be clean, moist, and open, so that we can quietly but thoroughly sniff. Picking of the nose, besides being a dirty habit, is liable to inflame the nose, and so cause it to be blocked up. The breathing in of dust, tobacco-smoke, and other impurities through the nostrils, tends to deaden the sense of smell, and this result is a great pity, for a sensitive sense of smell not only gives us great enjoyment with flowers, but warns us of disagreeable and dangerous odors.

8. Somehow, the sense of taste and the sense of smell seem to be related to one another. We pity the poor children who flatten their noses against the windows of restaurants and bakers' shops in their eagerness to see the things which smell so good, for we know that their mouths water when the savory odors from an oyster or beef stew or from hot gingerbread reaches their nostrils.

9. In some persons and beasts the sense of smell is very acute. It is said that some of the South American Indians can tell of the approach of strangers by the sense of smell. Dogs not only track persons, by the sense of smell, over the ground and through the snow, as the great dogs of Mount St. Bernard do, but the Esquimau dogs detect by smell food which is stored up a long distance away, and thus have saved their masters' lives.

10. *Hearing*.—By the sense of hearing we know of sounds whether they are high or low, harsh or sweet; we recognize the singing of birds, the rus-

ting of leaves, the murmur of brooks, the noise of great waterfalls, and the music from various kinds of



O C, outer canal ; I C, inner canal ; B, bones of the ear ; N, nerve of hearing.

instruments. Our ears are arranged somewhat like the large, open ends of trumpets, the better to catch the sounds. The hole seen in each ear is the commencement of a canal (O C) which goes downward and inward into the skull for about an inch. Across the

lower and inner end is stretched a thin membrane, generally called the *drum* of the ear, but really it is but a drum-head. Attached to the inner side of this drum-head, and reaching across a little room-like space to the other drum-head farther in, is a little bony chain, composed of three bones (B), which from their shape are called *the hammer, the anvil, and the stirrup*.

11. Sounds come to the ear in waves of air. The waves strike against the drum-head at the bottom of the canal, and cause it to move; this motion makes the chain of bones move, and their motion, because the bone farthest in is attached to another drum-head which fits into a sort of a window in a room connected with some bony canals, causes this drum-

head to move. In these canals in the skull the nerve of hearing is spread out in a little fluid to keep it from being injured.

12. When the inner drum-head moves, the fluid moves, and so sounds are conveyed to the nerve of hearing (N), and by it to the brain. Leading from the room where the ear-bones are, down into the throat, is a little tube (I C), by which air is admitted. If it were not for some such arrangement as this, waves of sound would strike against the drum-head too violently, or we should hear sounds indistinctly or disagreeably. If this tube is stopped up by saliva, or as the result of a sore throat, the sounds we hear are muffled or unpleasant. If the canal leading from the ear down to the outer drum-head is blocked up, as with dirt or ear-wax, we are more or less deaf. If the little bones of the ear can not move easily, we are likely to be very deaf.

13. Now you see how important it is to keep the ears and all parts connected with them clean and free from injury. Very few of us can prick up our ears as many animals do, the better to hear sounds, but we can keep our ears clean, by *gently* washing them or sponging them. Do not use hair-pins or other hard substances to remove dirt, for with them you may make a hole through the drum-head, and so spoil your hearing. Some people wear cotton in the ears for fear of catching cold. It not only looks badly, but tends to make the ears tender. Blows on the side of the head or over the ears may injure the

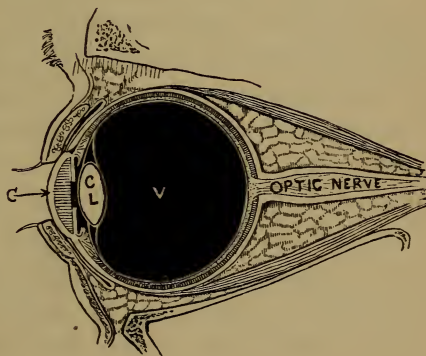
hearing, and even break the drum-head. Listening at key-holes, or at doors slightly ajar is not only bad manners but is a dangerous act; the currents of air reaching the ear in this way may cause earache, inflammation, and much suffering.

14. It is a dangerous trick, when a person's head is under water, as is often the case when boys are bathing in a pond or stream, for any one to strike together under the water shells or stones, for the sharp sounds produced may be conveyed so strongly by the waves of water against the drum as to cause deafness. It is dangerous, also, as well as cruel, for one person to come up suddenly behind another and make a loud noise directly into the ear.

15. *Sight*.—The sense of sight is the most wonderful of all the senses, for through it we receive ideas of light, color, size, shape, distance, and the motion of objects or things. Each eye is rounded, and about the size of an ordinary large marble or alley, and is in a sort of bony pocket in the front of the skull, where it rests in cushions of fat. It is further protected from jolting and other injuries by the eyelids. These we can close to keep out too much light, and the eyelashes or "eye-winkers" serve to keep out dust and insects. The eyebrows are not only placed where they are to improve our looks, but to keep perspiration from going into the eyes. The eyes have been likened to windows, for they let in the light, but they are more than windows, for the things we look at are pictured through them on the brain.

16. Light and the reflection of objects fall upon the front of the eye (*c*), pass through it, and through a little room, filled with a watery fluid; then through the little round black hole called the *pupil*; then through a clear, glass-like body, shaped something like an egg, and called the *crystalline lens* (*cl*); then through a clear, jelly-like fluid (*v*), which fills the larger room in each eye. Having passed through this room, the light and the reflection of an object fall upon the thin lining coat of this larger chamber. This coat is called the *retina*, and is connected with the *optic nerve*, or the nerve of sight. Thus we learn about light and pictures of objects.

17. Now you understand, I hope, how it is that the person who uses his eyes and sees as many pleasant things as he can, will be able to store up in the brain a large number of beautiful pictures to look at and think over at his leisure. Some one has said that "the way to be healthy, wealthy, and wise, is to shut your mouth and open your eyes"—that is, don't get into the habit of talking too much, but do get into the habit of observing. The fact is, each eye is somewhat like a photog-



rapher's camera, with its clear lenses to transmit the picture, its dark chamber to absorb any excess of light, and its sensitive plate to receive the picture.

18. When we look into an eye we look through the pupil, but see nothing but black—for we really see, through the thin lining of the eye, the dark coat beyond. The pupil is in the center of a movable curtain, called the *iris*, which is gray in some eyes, blue, black, or brown in others. When a very bright light strikes the eye this curtain so contracts that the pupil is made smaller. In the dark the pupil enlarges. You can see this change in the pupil if you look at the front of the eye of a friend, shading the eye with your hand and then taking your hand away.

19. You have now studied enough about human eyes to know that they are not at all like the eyes of dolls, and that care must be taken of them if we are to keep them in good condition. Don't stare at the sun or other very bright light, for you may ruin your eyes if you do. Do not wipe your eyes with a cloth or towel that has been used by a person with sore eyes, for fear that you may have sore eyes too. Don't get into the habit of looking cross-eyed; if you do, it may be impossible for your eyes to straighten themselves without the aid of the surgeon. Do not read while lying down or while riding in a street-car. Do not read, sew, write, or do any work at night which requires good eye-sight, unless the light from lamp or gas is bright and clear. If your eyes are weak, and

your doctor tells you that it is best for you to wear spectacles or eye-glasses, do so—don't be ashamed.

For Recitation.

1. How do ordinary sensations or impressions differ from those of touch, taste, smell, hearing, and sight? The last named are *special sensations*, or senses.

2. Why are they so named? Because they work through organs quite differently arranged from those through which ordinary sensations are conveyed.

3. Why are the organs of special sense sometimes spoken of as the five gateways of knowledge? Because through the skin, tongue, nose, ears, and eyes we come into contact with things outside of our bodies, and so learn about them.

4. What results from an improper use of the senses? The loss for us of much pleasure and information.

5. Of what use is the sense of touch? By it we appreciate the size, shape, and consistency of objects.

6. Of what use is the sense of taste? It tells us when food is palatable.

7. What will mar this sense? Sickness or the use of alcoholic drinks, of chewing tobacco, of highly-seasoned food.

8. Of what use is the sense of smell? By it we distinguish odors. Thus pleasure is increased and dangers avoided.

9. What is necessary for good hearing? To keep the ears clear and clean, and not to injure the parts.

10. Which is the most important of the senses? Sight, for by it we receive ideas of light, and the color, size, shape, distance, and motion of objects.



HERE WE ARE AGAIN.

APPENDIX.

ACCIDENTS, INJURIES, AND POISONS.

LESSON XVII.

Accidents, Injuries, and Poisons.

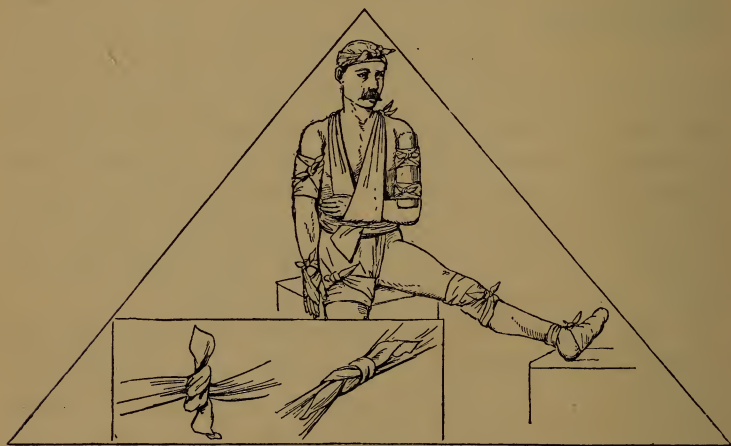


VERY child, I take it, has at some time or other pretended to be sick, so that he or she might have some sugar pills, or has limped about with a cane, or put his arm in a handkerchief, as in a sling, and made a call upon one of his playfellows who was the surgeon. Now, this is all play; but, really, any one of you may hurt or injure yourself at any time, and if the injury is a slight one, or if the accident is one that ought to be attended to at once, it is well to know how to do it. Remember that I said a *slight* injury, for you can not and should not expect to be doctor enough to always manage without a real doctor, and, if you try it, you will often do a great injury to yourself, or the person you are trying to help.

2. But there are many things which you can do, such as stopping the bleeding from a slight cut, arousing persons when they have fainted, relieving the pain of a burn, from hot water, a lighted match, or the steam from a tea-kettle, or giving something that will make one vomit what is believed will poison him and make him ill if left in the stomach. But to do these things, or others that will be told

of, you must not get excited. When an accident does happen, think for a moment what is to be done, then do it as well as you can, but don't cry, wring your hands, or make a fuss, or wonder why somebody don't do something. Do it yourself as quietly and quickly as you can, unless, of course, there is someone to help who knows how better than you do, and who will help. In fact, it is a great deal better to go away if you can not help in case of accident, than it is to form part of a crowd about the injured person, for crowds shut out the air, and hinder those who are trying to be of use. Remember, whenever you are tempted to join a crowd, but can do no good, *you are in the way*.

3. *Bandaging*.—One of the first things you ought to know is how to bind up or bandage a part of the body that



has been injured, either to help to stop bleeding or to keep torn parts in place, or as means of readily applying a lotion

or wash. This picture shows how a three-cornered piece of cloth, or a handkerchief, folded into that shape, can be applied as a bandage to almost any part of the body.

4. *Bleeding*.—If you remember how small an amount of blood will make a large stain, you will not be likely to be frightened when you see a bleeding wound. The fact is, that most of the bleeding you will see will come from small wounds, in which only capillary blood-vessels are injured, and such bleeding can generally be easily stopped by a few moments' pressure with the tip of the finger, or by a small pad, either over the wound or about its edges. Such press-



ure allows the blood to clot in the vessels, and so stops the bleeding. A piece of glazed card or of common brown paper held firmly on the cut, or wrapped about it, is better



than the thin sticking-plaster which is frequently used, and becomes easily soaked with blood, and does not hold in

place. If the bleeding continues in spite of the pressure you have applied, large blood-vessels probably have been injured, and it is then necessary to tie a handkerchief or a strip of cloth, or a piece of cord, about the limb *above* the injury, and twist it tight with a piece of wood, pressing, if possible, mainly over the large vessels that are injured below. In all cases where the bleeding has to be so controlled, the doctor should be sent for as soon as possible, as he may have to actually tie the vessels.

5. When the bleeding is controlled, and any dirt about the injury has been washed away, and the parts dried, if the



injury is a cut and not a torn wound, apply *little strips* of surgeon's rubber, or adhesive plaster, across the cut, so as to bring the sides together, as in the picture. Over the plaster place a small pad, and over this a bandage. Leave the plaster in place

for several days, until the edges of the cut are united, then remove the strips gradually and carefully. If the wound is a torn one, after the bleeding ceases, and the dirt and the blood-stains are washed away, and the parts dried, apply and keep in place on the wound until the doctor calls, two thicknesses of linen cloth soaked in water, carbolic acid, and glycerine, in proportions as follows: Carbolic

acid, ten drops ; glycerine, four teaspoonfuls ; water, one pint.

6. *Nose-bleed* is very seldom dangerous. Keep in the cool air, remain quiet, either sitting in a chair with the head inclined forward, so as to let the blood drip into a cup, or lie down with the head raised. Apply a cold key or cloth to the back of the neck, snuff cold water up into the nose, or water with a pinch of powdered alum in it. These measures generally are sufficient.

7. *Fainting*.—If any one becomes faint—that is, weak and insensible, or unconscious, no matter whether from fright, loss of blood, or any other cause—it is best to put the person *flat down on his back*, allow the air to reach him, but keep his feet warm. Hold for a moment or two, and from time to time, under the nostrils, some spirits of camphor or some *weak ammonia*, or, if the person can swallow, carefully give internally, in water, every five or ten minutes until the patient revives, two or four drops of aromatic spirits of ammonia, or brandy or whisky, if the aromatic ammonia can not be obtained.

8. *Bruises and Sprains*.—Children receive these frequently. The most important part of the treatment is to *keep the bruised or sprained part quiet*. Next apply, if possible, a flannel bandage, and keep it soaked, until pain has disappeared, with as hot water as can be comfortably borne, having put into the water liquid extract of witch-hazel or tincture of arnica, or even plain alcohol or bay-rum, in the proportion of one tablespoonful to the pint of water.

9. *Burns and Scalds*.—Children are liable to be burned from playing with matches, bonfires, fire-crackers, and gun-powder, and by blowing out lighted lamps ; to be scalded

by spilling upon the body a cup of hot tea or coffee, a plate of hot soup, or by playing with a steaming tea-kettle, or near the stove upon which fat is boiling for cooking purposes. If a person's clothes catch fire, lay him on the floor and wrap about him as quickly as possible, and so smother the fire, any woolen thing, such as a blanket, drugget, or piece of carpet. Do not use cotton or linen, for they catch fire too easily. Keep the fire away from the face if possible. After the fire is extinguished, or when a person is scalded, gently but quickly remove the clothing, cutting it if necessary. Apply to the injured skin, and *keep on till healing is effected*, strips of linen cloth soaked in carbolic acid, glycerine, and olive-oil—that is, one small teaspoonful of the first, two tablespoonfuls of the second, and a pint of the third, or “carbolyzed vaseline” (to be obtained at the drug-store) can be used. If neither can be obtained, try a thin paste of flour and water. The cloths should not be allowed to dry. Cotton-batting should not be applied to a burned surface.

10. *Fits or Convulsions*.—When a person has a fit, all that you can do, or ought to do, is to put him in as comfortable a position as possible, upon the floor, ground, or bed, so that he will not be injured by striking against any hard substance. Allow plenty of air to come to him, and, if there is danger of the tongue being bitten, try to put a cork or the knobbed end of a clothes-pin between the teeth, but look out for your own fingers while doing this. If the person does not recover from the fit in a few minutes, send for a doctor.

11. *Sunstroke or Heatstroke*.—The heat of the sun or of the kitchen, laundry, factory, or workshop may be so great

that some persons exposed to it grow weak and faint, and perhaps vomit. If the skin becomes cold, and the face pale, keep the head cool, admit air to the person, apply warmth to the feet by bottles of hot water, or by heated bricks, and try to give internally aromatic ammonia, or an alcoholic stimulant (see *Fainting*). If the skin is hot and the face flushed, give plenty of air, and apply to the head cloths wrung out in very cold water. Keep the person quiet for some time after he has begun to feel better.

12. *Suffocation*.—The back part of the mouth of a child, also the larynx and windpipe, are small, and if the inner portion of these parts swell much, or anything blocks them up, a child is more likely to strangle or suffocate than a grown person. Swallowing by mistake any irritating substance, such as a strong acid, carbolic acid, etc., will cause the parts to swell and inflame. All that you can do in such cases is to give freely to drink, milk, the white of eggs, or olive-oil. If the suffocation results from breathing in gas, substitute as soon as possible plenty of fresh, pure air. Children are not only suffocated but sometimes killed by pieces of food, small coin, jack-stones, buckles, or marbles, carried in the mouth, or from the toys, known as squeakers, suddenly and unconsciously being sucked into the throat, as the child is running or playing about.

13. Candy sold as April-fool candy, and containing tacks and other dangerous things, should be avoided. Beware of such candy, and of running or playing about with marbles or such things in your mouth. In case the person is choking, there is a struggle for breath, the face becomes bluish and swollen. *Instantly put your forefinger into the throat as far down as you can*, and attempt to hook out the

foreign body. If it is a crumb of bread or a piece of food, sometimes a swallow of water or a sharp patting on the back will get rid of it. If the substance is not brought out by any of these means, hold the person up if possible by the heels, at the same time that the back is smartly thumped. In cases of suffocation the sooner relief is attempted the better. Send for a doctor, but do not wait for him.

14. *Stings and Slivers*.—Bees, hornets, and other insects, if irritated, are apt to sting. In carelessly handling pieces of wood, especially wood that is partly decayed, or if thoughtlessly putting the hands into barrels and boxes, slivers of wood may run under the finger-nails or under the skin, and cause much pain. Small slivers, as well as the stings of insects can best be detected through a magnifying-glass. Remove the sliver or sting with a fine pair of forceps, or the point of a needle, then allay any pain that may exist with applications of carbolized vaseline, weak ammonia-water, or simply starch-paste, or thin mud. If a sliver is soft and not easily removed, especially from under the nail, do not persist in trying, as you may make your skin sore and break the sliver. Let a doctor remove it.

15. *Foreign Bodies in the Nose, Ears, and Eyes*.—By a foreign body is meant something which does not belong in the place in which it is found.

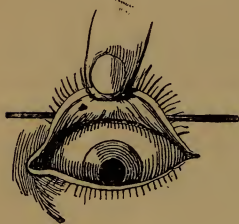
In the Nose.—Just as children will thoughtlessly carry things in the mouth, and, without meaning to, will suck them into the throat, so beans and peas, shoe and glove buttons, put into the nose may be snuffed up out of easy reach, causing discomfort and pain, and must be removed. Sometimes this can be done by forcibly blowing the nose, or by sneezing caused by tickling the inside of the nose with a

feather, or by the use of a pinch of snuff. If these means do not answer, and the foreign body *can be seen*, bend the rounded end of a hair-pin and gently attempt to hook out the foreign body. Rough or prolonged efforts at removal tend to seriously injure the nose.

16. *In the Ear*.—Some children foolishly put beans and other things into the ears, or flies or other insects find their way in and can not get out. Never try to remove any of these things by a bent hair-pin, or hook or probe of any kind, unless they are *very near* the opening, as you may injure the delicate drum-head. Inject into the ear plenty of warm water from a rubber syringe, holding the top of the ear upward and backward, and placing the point of the syringe in the *upper part* of the external canal, so that the stream of water can get behind the object and sweep it out. If an insect is in the ear, first drown it with a few drops of warm oil, left in the ear for a half-hour or hour.

17. *In the Eye*.—Anything that enters the eyeball had better be removed by the doctor, but dust and other particles that get under the eyelids can frequently be removed without the doctor's aid. If inside the lower lid, evert the lid, and with a fine camel's-hair brush, the rolled end of a clean, fine handkerchief, or a piece of soft sponge, remove the object, and then put into the eye three or four drops of good castor or olive oil, if the foreign body has excited redness. If the object is inside the upper lid, or on the eye, and not easily removed, as above—1. Blow the nose hard; this may bring the object within reach. 2. Take the eyelashes between the thumb and forefinger of the right or left hand, raise the upper lid outward, then bring it down so that it overlaps the lower lid. Now loosen the hold on the

lashes, and with the forefinger gently press the upper lid downward and inward toward the nose. This procedure may push out the object or bring it within reach. 3. Close



the upper lid and hold a large needle, or a tooth-pick, or a thin penholder, or lead-pencil, firmly but gently across the upper portion of the lid. With the free hand turn the lid by the lashes over this bar, so that you can examine its inner surface. Remove the object, and use castor or olive oil if necessary.

18. *Fractures or Broken Bones.*—If, after a fall or blow or other injury, a person can not move a limb, or part of a limb, probably either one or more bones are broken, or out of place. All that you can do is to make the person as comfortable as possible till the doctor comes, and to try to keep meddlesome persons away. If the injured part jerks, and so causes pain, or if it becomes necessary to move the person, it will be well to pad with cotton or handkerchiefs two or three pieces of light wood or stiff cardboard on one side, and bind about the part. (See bandage-picture, left arm of man.)

19. *Poisons.*—Many children are so curious to know how a thing feels, tastes, or smells, that they will handle things they should not, and will smell or taste of the contents of bottles, boxes, baskets, or other packages, that they may see in their own houses, or in the houses of friends, or that may be found in vacant lots. The result is that every once in a while we hear of a child being poisoned, and sometimes so badly that it dies. A good rule to observe is “*to touch not,*

taste not, handle not" anything that you do not know about, or anything that is used for medicine, or that you are told may not be used with safety.

20. *Alcohol*, kept in the house for use in the nursery-lamp, and for polishing purposes, has been drunk unintentionally, and has severely poisoned children. Any of the drinks which contain alcohol are dangerous drinks for children, and children have been poisoned (that is, made drunk) by what is called oftentimes a small amount of wine or beer. The ancients represented the danger that lurks in an alcoholic drink by a serpent coiled up in the bottom of a drinking-cup.

21. *Opium*, though a valuable medicine, is a poison, and should not be used except by the advice of a faithful doctor. It is a part of laudanum, paregoric, most soothing-sirups, and washes or liniments for rheumatism, neuralgia, or sprains.

22. *Oxalic acid*, another poison, is a white powder looking something like granulated sugar, and is used in houses to polish boilers and tea-kettles.

23. Most of the fly-papers and liquids and powders used in houses to destroy bugs and roaches contain *arsenic* or other poisons, and are dangerous. Some of the common water-color paints, and colored glazed papers which children use to make pin-wheels of, are poisonous if tasted of.

24. *Treatment*.—If there is reason to believe that a person has swallowed a poison, make him vomit by giving a large cupful or more of tepid water with a tablespoonful of salt in it, and by tickling the throat with a feather or by putting the forefinger into the throat. If the substance swallowed has scalded or burned the throat and other parts,

give the person freely white of eggs, milk, olive-oil, or thin mucilage. If the poisoned person seems drowsy, give a sup of strong coffee every ten minutes till he brightens up. If the skin is poisoned and inflamed, proceed as in a case of burn or scald. If it is inflamed by the puncture of a thorn, or poisonous part of a plant, proceed as under the head of stings and slivers.

25. *Poisonous Plants*.* — There are certain poisonous plants which grow in fields, vacant lots, along the road-side, or in waste places. In this class are the *stramonium* or Jamestown weed, with its cream-white, funnel-shaped blossoms, every part of plant poisonous; the common or *black nightshade*, leaves apparently worm-eaten, yellowish-white flowers, round, blue-black berries.

Hyoscyamus or *henbane*, tall weed, large leaves, blossoms dull-yellow, rimmed with purple, flower-cup urn-shape.

Wild parsnip, tall, grooved stem, flowers yellow and small, and in clusters.

Fool's parsley, hollow stem, dark-green leaves, white flowers, bad odor, fruit or seeds long and ribbed.

Poison ivy, oak, or vine, climbs trees, fences, etc., or runs along the ground, leaves in *groups of three*, shining green, change in the fall to bright yellow, orange, or mahogany color, berries dull-white, become pale, shiny-brown. The woodbine, or Virginia creeper, often mistaken for the ivy, has leaves in groups of *five*, dark-green, changing in autumn to bright crimson, berries dark-blue. It is not poison.

* It will be well for teachers to show pictures of poisonous plants. Refer to "Medical Botany of North America," William Wood & Co., and to Prang & Co.'s plates and descriptions of poisonous plants; also to photographs of plants by C. L. Lochman, New York.

There are also *lobelia*, or *Indian tobacco*, ten to fifteen inches high, leaves hairy, flowers small, pale-blue. The *daphne*, scarlet-poison berries. *Mushrooms*, some of which are poisonous, especially the crimson capped one dotted with white, and the *May-apple*, leaves, stem, and root; also *stinging nettles*, *poke-weed*, and *celandine*.

26. Some poisonous plants grow principally in moist or damp places, or in dark rich ground in the woods. In this class are *yew* or *ground-hemlock*, leaves and black seeds contain poison. *Sheep-laurel*, *sheep-poison*, or *lamb-kill*, leaves pale-green, flowers purplish - crimson. *The stagger-bush*, *Indian poke*, *Juck-in-pulpit*, and *skunk-cabbage*.

Poison-hemlock, three to six feet high, stem with purplish spots, flowers white and small in clusters, root deadly poison. *Water-hemlock*, flowers white, in umbrella-like clusters, seeds or fruit ribbed and nearly round, root deadly, herbage fatal to cattle. *Poison sumac*, *dogwood*, or *alder*, in swamps, small tree, leaves green, change in the fall to bright-yellow and crimson, leaf-stem remaining red, flowers small and greenish.

Bittersweet (not the popular cultivated plant by that name), in low ground, is a shrubby climber, blossoms blue-purple, with an orange-colored center, berries oval, and red. *Spotted cow-bean* or *mush-squash*.

27. There are garden plants, various parts of which are poisonous. Among these are: *Belladonna*, or *deadly nightshade*, leaves purplish, blossom pale-purple and bell-shaped, berries large and green, and change to black; the *foxglove*, flowers large, with deep purple spots, and the *larkspur*, *English honeysuckle*, *monk's-hood*, *anemone*, *buttercup*, and *clematis*.

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